ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

-1990-

BRISTOL BAY AREA

Regional Information Report[1] No. 91-1

STAFF

Naknek-Kvichak Area Management Biologist . . Donald L. Bill, Jr.
Egegik-Ugashik Area Management Biologist . . Richard B. Russell
Nushagak Area Management Biologist . . . . . Jeffrey R. Skrade
Togiak Area Management Biologist . . . . . Thomas E. Brookover

Research Project Leader . . . . . Beverly A. Cross
Research Biologist (West Side) . . . . . James Woolington
Research Biologist (East Side) . . . . . Barry Stratton
Research Biologist (Herring) . . . . . Katherine A. Rowell

Regional Office: . . 333 Raspberry Road, Anchorage, Alaska 99502
Area Offices: . . . . . P.O. Box 230, Dillingham, Alaska 99576
. . . . . P.O. Box 37, King Salmon, Alaska 99613

April, 1991

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ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES
MEMORANDUM

TO: Report Recipients

DATE: April 16, 1991

TELEPHONE: (907) 842-5227

FROM: Thomas E. Brookover
Togiak Area Management Biologist
Division of Commercial Fisheries
Dillingham

SUBJECT: 1990 Bristol Bay Annual Management Report

The attached report represents our most recent efforts to update and upgrade fishery statistics useful in describing the Bristol Bay salmon and herring fisheries. We believe this report is the most current and comprehensive document available describing and explaining management rationale, as well as providing a single source for catch, escapement and production information on all species of salmon and herring harvested in Bristol Bay during the last 20 years.

The report is not written for the general public as its intended audience. It is distributed only within Department circles with certain exceptions. Please route needed corrections or comments to the Dillingham office.

PREFACE

The 1990 Bristol Bay Management Report is the thirty-first consecutive annual volume reporting on management activities of the Division of Commercial Fisheries staff in Bristol Bay. The report emphasizes a descriptive account of the information, decisions, and rationale used to manage the Bristol Bay commercial salmon and herring fisheries, and outlines basic management objectives and procedures. We have included all information deemed necessary to fully explain the rationale behind management decisions formulated in 1990. All narrative and data tabulations in this volume are combined under separate SALMON and HERRING sections to aid in the use of this document as a reference source. The extensive set of tables has been updated to record previously unlisted data for easy reference. Fisheries data in this report supersedes information in previous reports. Corrections or comments should be directed to the Dillingham area office, Attention: Editor.

Thomas E. Brookover
Togiak Area Management Biologist
Dillingham

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the Commercial and Subsistence Fisheries staff of the Dillingham and King Salmon offices of the Alaska Department of Fish and Game for their contributions to this report. These Divisions employed 15 permanent employees and 73 seasonal employees in Bristol Bay during the 1990 season, each of whom participated in various area management and research programs. Thanks is extended to all personnel for a successful 1990 season.

Permanent Employees with the Commercial Fisheries Division

West Side

Jeffrey Skrade	Nushagak Biologist
Thomas Brookover	Togiak Biologist
Arthur Reynolds	Maintenance Mechanic
Dawn Jackson	Field Office Assistant
Katherine Rowell	Research Biologist
James Woolington	Research Biologist

East Side

Donald Bill	Naknek/Kvichak Biologist
Richard Russell	Egegik/Ugashik Biologist
Jeffrey Regnart	Asst Management Biologist
Beverly Cross	Research Project Leader
Barry Stratton	Asst Research Biologist
Nancy Deslauriers	Field Office Assistant

Seasonal Employees with the Commercial Fisheries Division

West Side

Mark Stopha	Management Asst
Michelle McCallum	Office Asst/Herring
Darci Cherry	Office Asst/Catch Sampler
Brad Palach	Herring/Nushagak Sonar
Heather Stilwell	Research Asst/Herring
Jim Miller	Herring
Phil Sheridan	Herring
Susan McNeil	Herring
Patrick Chiklak	Herring
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Jim Menard	Herring/Nushagak Sonar
Sally Backus	Herring
Ralph Andrew	Wood River Tower
R. K. Cobbin	Wood River Tower
Larry Stevens	Wood River Tower
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Ray Andrew	Igushik Tower

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ACKNOWLEDGEMENTS (Continued)

Nicholai Chris	Igushik Tower
Michael East	Togiak Tower
Dulce Ben	Togiak Tower
Mark Fink	Togiak Tower
Kirk Fisher	Nushagak Catch Sampler
Tim Hoyt	Togiak Catch Sampler
Matthew White	Nushagak Test Fish
Wesley Jones	Nushagak Sonar
Dave Vozka	Nushagak Sonar
Jon Syder	Nushagak Sonar
Chris Kaltonbacher	Nushagak Sonar
Chris Curgus	Wood River Smolt
David Wightman	Wood River Smolt
Oliver Roberts	Wood River Smolt

East Side

Fred Tilly	Field Camp Coordinator
Carolyn Morris	Office Manager
Debby Downing	Fish Ticket Editor
Autumn Hurd	Fish Ticket Data Entry
Tanya Wilson	Fish Ticket Data Entry
Debby Kerns	Scale Reader
Kathy Tilly	Scale Reader
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Susan McNeil	Supply Person
Dan Salmon	Kvichak Smolt
Don Perrin	Kvichak Smolt/Kvichak Tower
Roger Dunbar	Kvichak Smolt/Naknek Tower
Len Osimowicz	Egegik Smolt/Egegik Tower
Ken Leg	Egegik Smolt
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Richard Feia	Ugashik Smolt/Ugashik Tower
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Jacqueline Butt	Kvichak Tower
Lydia Olympic	District Test Fish
Sally Backes	District Test Fish
Darren Lawless	Kvichak Inside Test Fish
Aaryn Valencia	Kvichak Inside Test Fish
Brad Russell	Egegik Inside Test Fish

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Jeff Wallace	Egegik Inside Test Fish
Brad Fisher	Ugashik Inside Test Fish
Tom Kerns	Ugashik Inside Test Fish
Donna Cook	Catch Sampler
Joe Boutton	Catch Sampler
Fred West	Catch Sampler
Marlene Luke	Stock I.D.
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James Miluer	Stock I.D./Digitizer

Permanent Employees with the Subsistence Division

Janet Schichnes	Subsistence Resource Specialist
Molly Chythlook	Fish & Wildlife Technician
Ida Roehl	Field Office Assistant
Louis Brown	Programmer Analyst

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1990 BRISTOL BAY SALMON FISHERY

Management Area Description

The Bristol Bay management area includes all coastal waters and inland drainages east of a line from Cape Newenham to Cape Menshikof (Figure 1). The area includes six major river systems: Naknek, Kvichak, Egegik, Ugashik, Nushagak, and Togiak. Collectively, these rivers are home to the largest sockeye salmon fishery in the world. Sockeye salmon are by far the most abundant salmon species that return to Bristol Bay each year, but chinook, chum, coho, and (in even-years) pink runs are important to the fisheries as well.

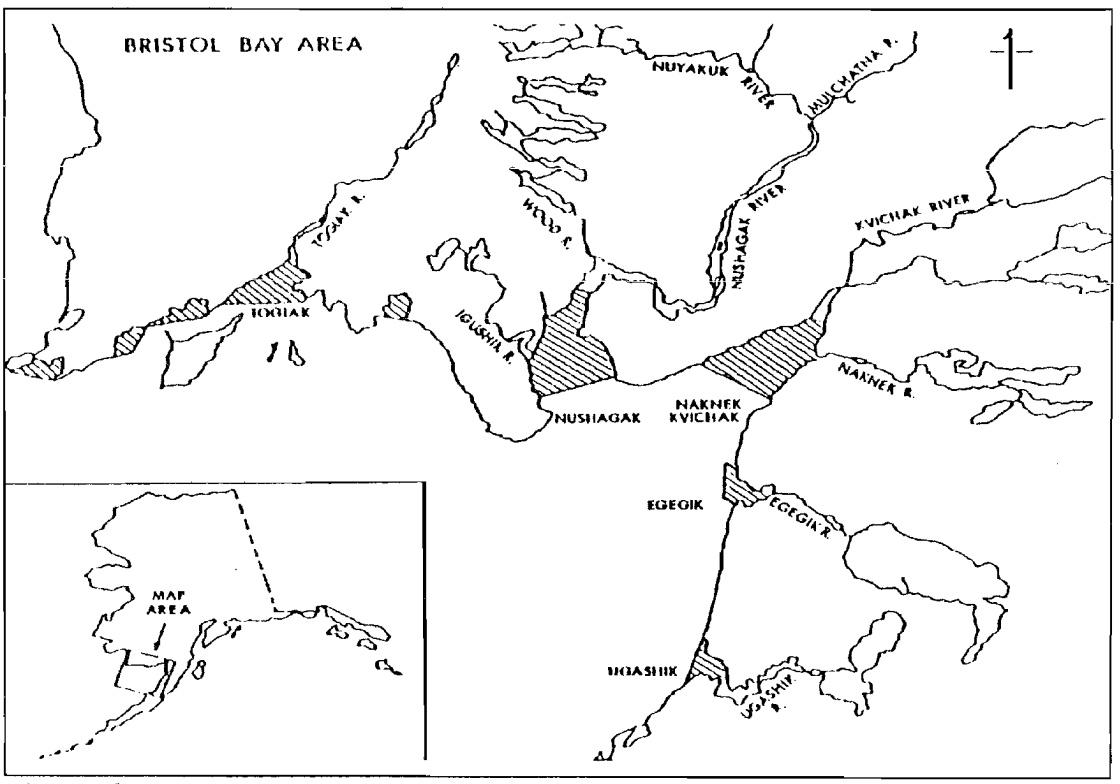

Figure 1. BRISTOL BAY Area Commercial Fisheries Salmon Management Districts.

The Bristol Bay management area is divided into five management districts that correspond to the major river drainages (Naknek-Kvichak, Egegik, Ugashik, Nushagak, and Togiak). The management objective for each district is to achieve desired escapement goals for the major salmon species while at the same time harvesting all fish in excess of the escapement requirement through orderly fisheries. In addition, regulatory management plans have been adopted by species for some management districts.

Legal gear for the salmon fishery includes both drift and set gill nets. Drift fishermen are the most numerous, and approximately 1,880 drift permits were registered in 1990 (Appendix Table 3). Set net permits registered in 1990 totaled 1,016. Drift fishermen are permitted 150 fathoms of gear, and set net fishermen are permitted 50 fathoms.

Fishery Run Strength Indicators

Inshore Preseason Forecast

Total sockeye salmon production for Bristol Bay in 1990 was forecasted to be 26.7 million fish. That number included the high seas Japanese Mothership harvest and the South Unimak/Shumagin Islands (False Pass) harvest. A run of that size would have been almost identical to the 20-year (1970-1989) mean inshore run (27.5 million), and approximately 26% less than the 10-year mean inshore run (34.7 million) (Appendix Table 21). The projected sockeye harvest, including the False Pass and Bristol Bay catches, was forecasted to be approximately 16 million fish.

Inshore sockeye salmon production in Bristol Bay was forecasted to be 25.4 million fish (Table 1). Every district expected a good inshore run, and every river system had an indicated harvestable surplus. The projected inshore harvest for sockeye salmon in 1990 was 14.7 million fish.

The 1990 forecast was based on spawner-recruit, sibling, and smolt data for each district. Returns prior to 1978 were omitted from the database in forecasting runs to the east side river systems, but were included in calculating projected runs to the Nushagak and Togiak River systems. The 1990 forecast was the first in which the forecasting methods were modified.

South Unimak/Shumagin Island Fishery

The in-season development of the South Unimak/Shumagin Island intercept sockeye fishery is closely monitored by Bristol Bay fishery managers for indications of migration timing, relative abundance, age composition and fish size in the incoming Bristol Bay run. Indications from these fisheries give the terminal fisheries managers notice of what to expect, as well as provide advanced warning of any potential differences that may exist between actual and forecasted run statistics.

These fisheries are managed under a guideline harvest (quota) policy, the South Unimak/Shumigan Islands June Fishery Management Plan, initially adopted in 1974 by the Alaska Board of Fisheries. The original intent of the Board was to prevent over-harvest of sockeye runs bound for individual river systems in Bristol Bay.

The management plan was brought before the Board for review in February, 1988. At that time the Board elected to maintain a traditional harvest pattern, and set maximum allowable harvest levels for the South Unimak and Shumigan Island fisheries at 6.8% and 1.5% of the Bristol Bay forecast, respectively. In addition, a maximum allowable harvest level of 500,000 chum salmon was instituted. The amendment stated that if the 500,000 chum harvest level was reached, the June fishery would be terminated for the season, regardless of the sockeye harvest at the time. This cap remained in effect during the 1990 season.

The Board of Fisheries again changed the management plan in 1990. First, allocated catches for both fisheries were apportioned by week. Second, the Board allowed a 5% carry-over harvest from the first weekly period to the second. For example, if the catch in the Shumigan Island and/or South Unimak fisheries should fall below the guidelines in the first weekly period, those unharvested sockeye salmon, up to a maximum of 5% of the total guideline harvest level for that fishery, will be added to the weekly guideline for the second period. Third, the maximum allowable chum catch was increased to 600,000 fish for both fisheries combined. Lastly, a "window" regulation, allowing no more than 96 hours of fishing time in a 7-day period, or no more than 72 consecutive hours of fishing, was removed.

The sockeye harvest allocation for the South Peninsula June fishery was 1,327,000 (1,087,000 for South Unimak and 240,000 for Shumigan Islands), based on the 1990 total catch projection. Weekly harvest levels for 1990 were scheduled as follows:

Weekly Period	South Unimak	Shumagin Islands
13 - 18 June	381,000 (35%)	84,000 (35%)
19 - 25 June	489,000 (45%)	108,000 (45%)
26 - 30 June	217,000 (20%)	48,000 (20%)
Total	1,087,000 (100%)	240,000 (100%)

South Unimak/Shumagin Island intercept fisheries actually landed over 1,347,000 sockeye salmon of North Peninsula/Bristol Bay origin in 1990 (Appendix Table 45).

Fishery Harvest Potential

Formal run forecasts for salmon species other than sockeye and Nushagak River chinook salmon are not generally available because long-term escapement data are limited. However, catch projections were calculated based on relative estimates of parental run size, average age composition data, and recent relative productivity patterns. Catch potential and actual harvests for all species in 1990 are listed below:

Species	Potential	Actual
Sockeye	14,662,000	33,165,000
Chinook	78,000[a]	33,000
Chum	1,272,000	1,008,000
Pink	1,750,000	517,000
Coho	172,000	100,000
Total	17,934,000	34,822,000

[a] Includes actual forecast for Nushagak District, and 20-year average chinook catches for Naknek/Kvichak, Egegik, Ugashik, and Togiak.

Large sockeye runs in recent years and a higher forecast by FRI-Fisheries Research Institute (FRI) at the University of Washington contributed to considerable uncertainty over the ADF&G forecast by the industry. Many of the processors were prepared for a run larger than the ADF&G forecast. Very large

catches by the industry-sponsored test boat at Port Moller indicated a larger return to the Bay, and spurred several of the major processors to purchase additional supplies.

During the 1990 season in Bristol Bay, nine companies canned, 32 companies froze, and one company cured. In addition, 19 companies exported fresh fish by air, and 21 companies shipped salmon out by sea in refrigerated sea water (RSW) or brine (Table 35). A total of 36 processors/buyers reported catches in Bristol Bay 1990 compared with 72, 62, 59, 48, 57, 42, and 37 in the years 1982-1989 (ADF&G 1982-89).

Fishery Economics and Market Production

Price disputes have not been significant in Bristol Bay recently, due to a large increase in the number of floating fish processors and the establishment of several individual market agreements with small groups of fishermen. Neither of the two major fishermen's groups in Bristol Bay, Alaska Independent Fishermen's Marketing Association (AIFMA) or Western Alaska Fishermen's Marketing Association (WACMA), have held price negotiations in recent years, largely due to the major change in the markets for salmon. Instead, both organizations have elected to concentrate on other issues such as boat storage and support services.

Salmon prices dropped overall in comparison to 1989 (Table 39). The price for sockeye salmon dropped from $1.93/lb. in 1988 to $1.07/lb. in 1989, and to $1.04/lb. in 1990. Chinook salmon prices increased from $0.80 to $0.91/lb., chum salmon prices remained the same at $0.26/lb., and coho salmon prices increased from $0.67 to $0.74/lb. in 1990. These figures do not include post-season bonuses, but as of April 1991, we know of no companies who have paid additional amounts to their fishermen for last season's catch.

No directed commercial fishery occurred in Nushagak District for chinook salmon during 1990. The commercial harvest in Nushagak District this season of 14,000 chinook salmon (Table 18) was taken incidentally in the sockeye fishery. Consequently, many of the fish landed were blushed and did not command top prices.

The value of the combined commercial salmon inshore harvest is estimated at $200.4 million to participating fishermen, the highest exvessel value ever recorded for the Bristol Bay salmon fishery (Table 39 and Appendix Table 38). This was the eighth consecutive year that the exvessel value has exceeded $100 million, and the first time it has exceeded $200 million.

Commercial Salmon Fishery

The five species of Pacific salmon found in Bristol Bay are the focus of commercial, subsistence and sport fisheries. Annual commercial catches (1971-1990) average 15.9 million sockeye salmon, 112,000 chinook, 1.1 million chum, 182,000 coho, and 1.7 million (even years only) pink salmon (Appendix Tables 5-9). Annual subsistence catches average approximately 162,000 salmon and are comprised primarily of sockeye salmon (Appendix Table 46). Sport fisheries operate to varying degrees of intensity on all species of salmon, with most effort directed toward chinook and coho stocks.

The combined commercial salmon inshore harvest in Bristol Bay totaled 34.8 million fish (Table 25). That catch is the second largest in the 98-year history of the fishery, and is considerably greater than the harvest of 30.2 million landed in 1989 (Appendix Table 10).

Sockeye Salmon

The 1990 inshore sockeye run of 47.8 million fish was 47% greater than the preseason forecast (Table 1 and 4). The actual run was also 38% greater than the 10-year average (34.7 million fish) (Appendix Table 21). In the Ugashik District, the actual run never reached the forecasted run size, but runs to the other Districts ranged from 13% to 57% greater than forecast (Table 1). Runs to individual districts were: 51% greater than the forecast for the Naknek/Kvichak District; 55% greater than the forecast for the Egegik District; 6% less than the forecast for the Ugashik District; 39% greater than the forecast for the Nushagak District; and 13% greater than the forecast for the Togiak District.

Sockeye salmon dominated the inshore commercial harvest, and totaled 33.2 million fish (Table 4). The 1990 harvest was second only to the 1983 harvest (37.4 million) and was more than double the 20-year average (15.9 million)(Appendix

Table 5). Sockeye escapement goals were met in 1990 in all river systems where spawning requirements have been defined (Table 1).

Chinook Salmon

A new management approach was taken by the Alaska Board of Fisheries for the 1988 season due to concern for the future of chinook stocks in Nushagak and several other districts. Several regulations were adopted by the Board to provide a better opportunity to achieve viable escapements. The season opening date was changed to June 1 for all districts, the "king line" in Nushagak was abolished, Egegik and Ugashik Districts went to a 4-day fishing schedule before and after the emergency order period, the emergency order period in the Nushagak District was adjusted to begin on June 1, and the management staff was given emergency order authority to reduce mesh size in Nushagak District (if necessary). These regulations are still in effect and were used by staff to reduce both directed and incidental chinook harvests.

Chinook catches in all districts were far below recent averages (Appendix Table 6). The 1990 bay-wide commercial harvest of 33,000 chinook was the lowest harvest since 1975, the second lowest in the 41-year period from 1950-91, and the fifth consecutive year that the harvest has fallen below the 20-year average (112,000 fish)(ADF&G 1983).

The Nushagak District is the primary producer of chinook salmon in Bristol Bay, and is the only district for which a chinook salmon forecast is generated. The 1990 preseason forecast for the Nushagak District chinook run was 116,000 fish (Appendix Table 1). With an escapement goal of 75,000, only a small harvestable surplus was anticipated. The actual commercial harvest in the Nushagak District totaled 14,000 fish, and was the lowest harvest in the district since 1945. Chinook escapement in Nushagak District totaled 64,000 fish, 15% less than the desired goal of 75,000 (Table 27).

The Togiak District harvest of 12,000 chinook salmon was less than the 20-year average for the fifth consecutive year, and slightly greater than one-half the 10-year average (Appendix Table 31). Escapement in Togiak District was estimated at 9,000 chinook salmon, marking the sixth consecutive year that less than 14,000

chinook have escaped to spawn, compared to the long-term average of 17,000 fish.

Chum Salmon

The inshore commercial harvest of 1.0 million chum salmon was slightly below the 20-year average of 1.1 million (Appendix Table 7). Chum catches in the Nushagak, Togiak, and Ugashik Districts were well below the 20-year averages for those districts, while chum catches in the Naknek-Kvichak and Egegik Districts were well above their long-term averages.

Escapements to the Nushagak and Togiak systems were 330,000 and 67,000 fish, respectively (Appendix Table 32). The provisional escapement goal is 350,000 fish for the Nushagak River and 200,000 fish for the Togiak. Extensive fishing authorized to harvest excess sockeye was responsible for relatively weak chum escapements in the Naknek-Kvichak, Egegik, and Ugashik Districts.

Pink Salmon

Bristol Bay has a dominant even-year pink run, therefore runs in 1990 were orders of magnitude higher than the 1989 run (Appendix Tables 8 and 34).

The Bristol Bay pink harvest of 517,000 in 1990 was the lowest even year catch since 1986, and was less than one third of the 1971-90 average. However, the pink harvests in Naknek-Kvichak and Egegik were above average.

Coho Salmon

Due to a poor run of coho in 1986 in the Nushagak and Togiak Districts, the primary producers in Bristol Bay, a less than average run was expected in 1990 (Appendix Table 36). Most districts required a reduction in the fishing schedule to achieve escapement objectives.

The area-wide commercial harvest totaled 100,000 fish, considerably less than the long-term average catch of 182,000 fish, and only 39% of the 10-year average (259,000 fish)(Appendix Table 9). Coho runs were disappointingly small in both the Nushagak and Togiak Districts (Appendix Table 36). The Nushagak District, which normally produces 44% of Bristol Bay's coho harvest, accounted for only 7%

of the total inshore harvest in 1990. Coho catches were similar to the 10-year average in the Naknek-Kvichak, Egegik, and Ugashik Districts (Appendix Table 9).

Due to conservation concerns for both pink and coho salmon in the Nushagak District, the traditional 5-day fishing schedule following the emergency order period was dropped in favor of management by emergency order. After one 24-hr period and one 12-hr period, low commercial catches and low escapements of both species indicated that a long closure would be necessary to secure viable escapements.

Coho escapement estimated at the Portage Creek sonar project totaled 163,000 fish, slightly over the provisional goal of 150,000 fish (Table 27). However, due to special funding in 1990 the project operated until September 12, almost one month longer than normal. Had the project been terminated on August 17, as is normally the case, the coho escapement would have totaled approximately 124,000 fish.

Fishing time in the Togiak District was sharply reduced by emergency order in the beginning of the coho run, and ultimately closed completely in an attempt to attain the provisional escapement goal of 50,000 fish for that river. The estimated total coho escapement in the Togiak River for 1990 was 21,390 fish, still well below the season end goal (ADF&G 1990). The coho return to the Kulukak Section was stronger than the other sections of the Togiak District and the escapement in that drainage totaled 15,585 fish, slightly over the provisional goal of 15,000 fish.

Commercial fishing time was reduced by emergency order at times in all of the east-side districts in an effort to secure desired escapement.

SALMON SEASON SUMMARY BY DISTRICT

Naknek-Kvichak District

The total run of sockeye salmon to the Naknek-Kvichak District was projected at nearly 13.0 million fish (Table 1). Escapement goals were set at 6.0 million (range 6.0-10.0 million) for the Kvichak River and 1.0 million (range 0.8-1.4 million) for the Naknek River. The district harvest forecast totaled nearly 5.8 million sockeye. No large fluctuation from the forecast was expected for the Kvichak River (as had been the case in 1989) although there was a possibility that the 2.3 age class could return stronger than forecasted. The actual run to the district totaled more than 26.3 million sockeye, and the actual harvest totaled over 17.1 million.

Preseason management strategy for sockeye salmon called for some openings early in the run to monitor both run size and age class in the District. Catches and age composition at False Pass and Port Moller would be monitored for any marked differences from the forecast. Commercial catches and age class in the Egegik and Ugashik Districts would also be monitored closely.

The Board of Fisheries passed a regulation regarding opening times for the Naknek-Kvichak District during their winter meeting. Opening times were to commence at the uniform tide level of approximately seven feet above mean low water on rising tides. The 7-ft level would be measured at the entrance of the Naknek River.

No forecast is made for chinook salmon in the Naknek-Kvichak District. However, with a forecasted harvest of 41,000 chinook salmon in the Nushagak District, a pronounced effort increase in the Naknek-Kvichak District was likely, due to extended closures in the Nushagak District chinook fishery. An increase in effort could result in a reduction of fishing time. A fall fishing co-op was formed in 1988 and resulted in a tremendous increase in fall fishing effort over the past two years. Pink Salmon should be returning in good numbers to the district based on good escapements in 1988. Additional effort would be monitored during the pink and coho salmon fisheries and adjustments to fishing time would be made depending on the strength of each run.

Daily chinook catches started out slow and remained less than average in the Ugashik District through June 12 (Table 17). This was the first sign of a potentially poor run and close attention would be paid to commercial and subsistence catches in the various districts, and sport fish catches in the Naknek River.

The Port Moller test fish project began operations June 11 (Table 6). Catches were about one third of the catches at the same time last year, and fish were fairly small (515 mm). The test boat catch rose slightly on June 12, with most fish caught in the middle of the transect. The boat was unable to fish June 13 due to inclement weather. The fishery at False Pass was also affected by bad weather and catches there were not impressive (Appendix Table 45). The CPUE in the Naknek River sport fishery for chinook salmon on June 13 was .0880.

Port Moller was able to fish again on June 14. Indices for June 14 and 15 were 12 and 21, respectively, but the cumulative index through June 15 was just over half of what it was in 1989. Several commercial fishermen mentioned that there were many small chinook around, but few large fish. Sport fishing improved in the Naknek River on June 15 and 16, apparently due to winds a few days earlier. Chinook escapement into the Nushagak River was tracking ahead of schedule, however no commercial fishing had been allowed as yet. The weather was still poor in the False Pass area and catches there were low. Port Moller was again blown out on June 16.

Sport fish CPUE increased on June 17 to .2667 in the morning and .0690 in the evening. The CPUE dropped slightly on June 18 to .0634 in the morning and .0687 in the evening. The False Pass fishery was extended several times due to poor weather. Catches remained unimpressive in both the South Unimak and the Shumigan Island areas. The Port Moller test boat indices began to rise slowly on June 18. Fish size and age composition at both False Pass and Port Moller did not appear out of the ordinary. Commercial catches in the Naknek-Kvichak District began to increase June 19 and several 1,000 lb. plus deliveries were reported, but the average catch was not impressive.

Sport fish CPUE for chinook dropped on June 19 to .0508 and .0238 in the a.m. and p.m., respectively. According to Sport Fish Staff, chinook salmon sport catches were not much different than the recent 4-year average, and may have been

slightly ahead of catches last year at that time. However, continued reports of very few large kings and a registered commercial fishing fleet of 773 vessels as of 6:30 p.m., June 20, prompted a closure of the Naknek-Kvichak District effective 9:00 a.m., June 22. This would allow an additional 24-hour closure to procure escapement during the peak of the chinook run.

False Pass was extended again and catches were still slow. The stock separation test boat catches in the Egegik District were weak, as were the Egegik River test fish catches. Weather worsened and on June 19 the Port Moller test boat lost steering capability, resulting in three days lost to fishing time. The status of all fisheries remained similar through June 21 and June 22.

The Port Moller test boat resumed fishing on June 22 and recorded an index of 58. Commercial catches continued to improve in the Naknek-Kvichak District, however the age composition showed a much higher percentage of age 1.3 fish than had been anticipated. False Pass catches increased June 21 and June 22. Although the Naknek-Kvichak run timing looked average, there seemed to be other evidence pointing to a later run than normal. Naknek River tower began to get a few sockeye by on June 23 (Table 26), but no fish were caught in the Kvichak River test fish program (Table 28). The South Unimak fishery was again doing well on June 23. The daily catch in South Unimak surpassed 100,000 fish for the third consecutive day, and an extension was granted until 10:00 p.m., June 24. The Port Moller index on June 23 was 69, and the average fish length for all stations ranged from 544-581 mm.. I question whether this is the very first part of the run. The Naknek Tower count is one day ahead of schedule, while Kvichak River test fishing is still poor. Most indicators are at least one day behind the long-term average for this time period. Don Rogers (FRI) forecast a total run of 32.0 million sockeye based on Port Moller catches to date.

District test boats were dispatched June 25. Catches were mediocre at best. Nushagak District test boat catches were also low on June 24. River test fish catches were not impressive either, however, the Port Moller test indices more than doubled on June 24 to 147. Jumpers at Diamond M and in the Ships Anchorage were reported the evening of June 25. Naknek river tower counts picked up substantially on the morning of June 26, with a 10:00 a.m. count of 12,000 and a 2:00 p.m. count of 47,000 fish. District test boats picked up good catches in the upper Kvichak Section at the end of the morning tide of June 26, however,

catches dropped considerably on the ebb and the next flood. Naknek River tower counts dropped to less than 1,000 fish/hr. from 2:00-6:00 p.m.. A cursory aerial survey of the Naknek River and the lower three index areas of the Kvichak River showed very few fish. Kvichak River test fish caught no fish on the evening tide. Port Moller indices again increased on June 25 to 160.

The Naknek River escapement picked up again the morning of June 27 with more than 9,000 through the 6:00 a.m. tower count. Counts dropped off, however, after 6:00 a.m. to 11,000 at 10:00 a.m. and 15,000 at 6:00 p.m.. A district test boat caught a few fish on the west side of the district but catches on the east side were poor. South Unimak fished on June 26 and had the best catch yet, but the average fish size was high for this late in the season. Kvichak River test fish indices increased the morning of June 28. District test boats were reporting good catches and there was evidence of fish from east to west. Several excellent catches were made on the west side. Tenders and other vessels in the Naknek Section reported jumpers. A 10-hour fishing period from 5:45 p.m., June 28 until 3:45 p.m., June 29 was announced at noon, June 28. This was based on: (1) a Naknek River escapement of 103,000 through 10:00 a.m., June 28, two days ahead of the long-term average, (2) district test boats catching good numbers of fish in both sections, (3) reports of good numbers of fish within and below the Naknek Section, (4) an increase in Kvichak River test fish indices over the last two tides, (5) high Port Moller test fish indices since June 24, (6) the closure in effect since the morning of June 22, and (7) forecasted harvestable surpluses for both rivers.

Fog covered most of the district so a good survey was not possible, however, very little effort was apparent on the east side. Later reports indicated that the best fishing was in the middle of the Kvichak Section, along the division line near Pederson Point. The estimated catch was 800,000 sockeye, and the actual catch totaled 815,000 fish (Table 15). An announcement was made at 6:00 p.m., June 29 for an 11-hour fishing period for the Naknek Section only, from 6:30 a.m., June 30 until 5:30 p.m., June 30. This was 15 minutes later than the 7-ft level because of predicted SE winds. Reasons for the opening were: (1) the Naknek River escapement through 2:00 p.m., June 29 totaled 267,000 fish, still two days ahead of the long-term average, (2) another tide of fish is still in the river above the district, (3) effort during the last period was concentrated mostly on Kvichak River fish and additional effort needed to be focused on Naknek

River fish, (4) Kvichak River escapement is slightly behind schedule and additional closed time is needed in that system, (5) there were reports of quite a few fish at Low Point and Johnson Hill, and (6) catches at Port Moller and False Pass indicate fish are still passing those areas in large numbers.

Tim LaPorte in Iliamna reported that the water level of the Newhalen River is as high as it is in the fall. This could prove to be a problem if the river continued to rise, and a close watch would be kept on the situation. Large Port Moller indices continued, on June 26, 27, and 28 at 118, 147, and 302, respectively. Officer Dykema (F&WP) flew the district shortly after the opening and reported the most fish he had ever seen at the upper end of the "Y". Kvichak River test fish catches remained fairly low with indices on the morning tide of June 30 of 82 and 944 for the west and east banks, respectively.[1] The Naknek River escapement continued to rise and, with an additional 26,000 through 2:00 p.m., June 30, reached 300,000 fish cumulative. Catches in the Naknek Section opening were strong with 10-14,000 lb. deliveries common. The total catch for the period was first estimated at 1.1 million and the actual totaled 960,000 fish. Indices at the Kvichak River test fish site improved on the evening tide of June 30 to 235 and 5,468. Port Moller indices remained very high on June 29 and June 30 at 227 and 285, respectively.

The Naknek River escapement through 6:00 a.m. July 1 totaled over 426,000 fish, with daily counts on June 29 and June 30 of 147,000 fish each. This was nearly three days ahead of the long-term average and represented nearly half of the escapement goal. The Kvichak River escapement, meanwhile, was estimated at 364,000 fish (39,000 past the tower and 325,000 estimated in the river). Although early in the run, this level of escapement was less than the long-term average. These two escapement factors, in addition to positive Port Moller catches, prompted another announcement at 9:00 a.m. for an opening in Naknek Section only, from 8:30 p.m., July 1 until 6:30 a.m., July 2. Kvichak fishermen were also advised to stand by at 3:00 p.m. for a possible announcement for fishing time that evening. If the Kvichak River test fish indices were very large, an opening for that section would be possible.

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[1] Further references to the Kvichak River test indices will indicate the west bank first, followed by the east bank.

Various bits of information trickled in during the day. The Egegik River test fish project made excellent catches on the morning tide. Fishermen were reporting high numbers of jumpers on both sides of the Naknek River entrance and fish were reported on the west side during the flood, but not the ebb. Either those fish went up the river, or they backed completely out of the district. Kvichak River test fish drifts were very good on the morning tide, at 2,100 and 9,100. Good indices on the west bank usually indicate a large push of fish up the river. For this reason, an announcement was made at 3:00 p.m. for the Kvichak Section to open from 8:30 p.m., July 1 until 6:30 a.m., July 2. An aerial survey of the Kvichak River that evening showed good numbers of fish from the second index area down, but conditions were poor. Jumpers were noted from Graveyard to Levelock.

A survey of the opening was not that impressive. Catches did not look that good and most of the effort was concentrated in upper Ships Anchorage and towards Graveyard and in the upper Naknek Section. The only encouraging catches on the beach sites were documented at the upper two thirds of the South Naknek beach.

The evening tide on July 1 produced indices of 4,900 and 8,200 at the Kvichak River test site. Through 10:00 a.m., July 2, the Naknek River escapement totaled over 737,000 fish, about five days ahead of the long-term average. The Kvichak River escapement through the same time period totaled 81,000 fish past the tower and approximately 900,000 in the river. An announcement was made at noon, July 2 to open only the Naknek Section for 10 hours from 9:15 p.m., July 2 until 7:15 a.m., July 3. Kvichak fishermen were asked to standby at 3:00 p.m. for any announcements for that area. River test fish indices had been good for two tides and results from the next flood would be the determining factor. The resulting indices (4,100 and 7,900) were down slightly from the previous tide, and an announcement was made at 3:00 p.m. that Kvichak Section would not open in the evening. Fishermen were advised to standby later for a possible opening on July 3.

Port Moller catches were still fairly strong at 208 index points on July 1. Port Moller was the only indication to date of a large run. Catch and CPUE at False Pass indicated a run slightly less than forecast, while inshore forecasts indicated a run slightly greater than forecast. Fish began a strong push into Egegik District on the July 1 morning tide and it appeared that fish were pushing

into the Nushagak District on July 2. Reports were coming in of numerous jumpers all over the west side. These reports prompted an announcement at 8:00 p.m. for an opening for the entire Naknek-Kvichak District from 7:15 a.m. until 7:15 p.m., July 3.

The Naknek River run appeared to be not only on time, but strong, while the Kvichak River run was apparently late and possibly stronger than forecast.

Only very short closures in the Naknek Section, from this point on, would prevent a large excess of escapement. An aerial survey on evening of July 2 indicated 1.2 million fish in the river while the formula estimate was very close at somewhat over 1.2 million. Preliminary reports indicated that the opening didn't look that impressive, but chop on the water prevented any real indication of success. There were reports of a large volume of fish up to five mi offshore, extending from just below Johnson Hill to outside of the Ugashik District.

The Kvichak River tower escapement increased to over 15,000 fish per hour the morning of July 3. Through July 2 the Kvichak River escapement was five days behind schedule, but with present passage rates a considerable gain throughout the day was expected. River test fish indices on the morning tide were still fair at 538 and 6,957. Reports later in the period indicated that even the less aggressive fishermen were averaging 10-12,000 lbs.. It appeared that the Naknek Section opening was good with the average catch approximating 5,000 lbs.. The South Naknek beach catch was very large and broke the 1-tide record. The cumulative harvest through July 2 was estimated at 3.3 million, while the actual harvest at this point totaled 2.8 million. Egegik District catches were also strong, however, Nushagak District catches were disappointing.

An aerial survey of the Kvichak River the afternoon of July 3 showed similar numbers of fish to yesterday. Port Moller test indices continued to be strong with an index of 168 on July 2. Kvichak River test fish indices in the afternoon dropped to 431 and 3,429, but fishermen were still reporting large volumes of fish outside and between districts. At 6:00 p.m., July 3 the Naknek River escapement totaled 920,000. The Kvichak River escapement was estimated at 1.7 million, with 644,000 past the tower and an additional 1.1 million still in the river. An announcement was made at 8:00 p.m., for a Naknek Section (only) opening from 8:15 a.m., July 4 until 8:15 p.m., July 4. Kvichak fishermen were

advised to stand by at regular announcement times on July 4.

The commercial catch through July 3 was estimated at 4.6 million sockeye. Catches the past few days in the Naknek-Kvichak and Egegik Districts had been strong and a few processors were on limits and/or had suspended operations. As of 10:00 a.m., July 4 the Naknek River reached its escapement goal of 1.0 million sockeye. Many reports of large numbers of fish between and outside districts were continuing. Kvichak River test fish results were still fair and an increase in catches was suspected on the evening tide. Fishermen were also reporting fish on the west side of the district. If present passage rates past Kvichak tower continued through the evening, the escapement will be on schedule with the long-term average. Port Moller indices on July 3 increased to 227 and were still indicating a much larger run than initially expected, although it had yet to show inshore. An announcement was made at 4:00 p.m. for a Naknek Section opening from 8:15 p.m., July 4 until 8:15 p.m., July 5, and for a Kvichak Section opening from 9:15 a.m., July 5 until 8:15 p.m., July 5. The Naknek Section may be reduced in size if Kvichak River escapement begins to fall behind and Naknek River fish continue to enter the area. The estimated Kvichak River escapement at this time was 1.2 million past the tower and 800-900,000 fish in the river. The Naknek-Kvichak total run through July 3 indicated a run in excess of 20.0 million, compared to a forecast of 13.0 million.

Commercial catches continued in strength. The cumulative catch through July 4 was estimated at 5.8 million. More processors went on limits and/or suspended operations. The Kvichak river test fish results were not impressive although the crew reported evidence of fish throughout the night. Fish were beginning to show in large numbers in the Nushagak area and fish in Egegik continued to show in strength. Although the Naknek River escapement goal had been exceeded the entire area closed for a short period for the following reasons: (1) more Kvichak River escapement was needed to keep up with the long-term average, (2) the 1990 Naknek River run originated from escapements much larger than the goal, and therefore, some additional escapement would not be detrimental, (3) the majority of the companies were having trouble processing the large amount of fish and an orderly harvest was in jeopardy, and (4) fishing has been continuous in the Naknek Section for 36 hours and a short 1-tide closure would not put that many extra fish into the escapement.

An announcement was made at 8:00 p.m. for an opening in the Naknek Section from 10:00 a.m., July 6 until 10:00 p.m., July 6. Fishermen in the Kvichak Section were asked to standby at 9:00 a.m., July 6 for a possible opening, dependent upon test fish results on the next tide and an early morning aerial survey of the Kvichak River. Don Rogers generated a forecast the evening of July 4 for each district, based on Port Moller test fish catches through July 3. The Bay-wide total run estimate was 38.5 million fish with an estimated 23.0 million destined for the Naknek-Kvichak District.

The cumulative Naknek-Kvichak District harvest through July 5 was estimated at 7.5 million fish. An early morning survey of the Kvichak River produced an estimate of 1.1-1.3 million in the river. This, coupled with the 6:00 a.m., July 6 tower count of 2.0 million, gave a total escapement of 3.1-3.3 million, over half of the point escapement goal. The indices at Kvichak River test fish on the evening tide were high at 4,900 and 3,000, indicating a fairly substantial movement of fish up the river. The Port Moller test boat concluded its season on July 5, and was still catching good numbers of fish (Station 2 index = 64.3). Run timing, based on catch and escapement figures through July 5, indicated a district total run of 22.7 million fish. In addition, fish were reported within and below the district. If present run conditions remained the same for several days, as indicated by Naknek-Kvichak run timing and strength, Port Moller catch size and timing, escapement rates and timing, aerial survey estimates, and tower count reports, there should be a harvestable surplus of sockeye in the district.

Although the amount of surplus would not be known, putting the entire fleet on the Kvichak side would prevent escapement from keeping up with the long-term average. Therefore, in accordance with 5 AAC 06.320 (f), the Kvichak Section was opened from 10:00 a.m., July 6 until 10:00 p.m., July 6 for set gill nets only. The usual complaining from the public was received at this announcement. Additionally, at 3:00 p.m. a 24-hour extension for the Naknek Section was announced to last until 10:00 p.m., July 7, and Kvichak fishermen were asked to stand by at 6:00 p.m. for anything further concerning fishing time. An aerial survey of the Kvichak River was flown at 4:00 p.m. and indicated strong numbers of fish throughout the entire river and down to Graveyard. River test fish indices dropped to 2,100 and 2,200 on the afternoon tide. The total Kvichak River escapement at 2:00 p.m., July 6 was estimated at 3.2 - 3.4 million, not including fish that entered the lower river on the last tide. A survey of the

district at 3:00 p.m. showed good catches on the Johnson Hill line near the buoy and very good catches by set nets in the Cutbank and Graveyard areas. No announcement was made at 6:00 p.m.

Kvichak River test fish indices increased on the morning tide to 2,400 and 4,700. The cumulative tower count through July 6 totaled 2.4 million with an hourly rate (6:00 a.m., July 7) of over 16,000 fish. This escapement was one day ahead of the long-term average, but daily escapements would have to exceed 0.5 million for the next two days to keep pace with the normal run timing. District catch and escapement through July 6 projected the total run to the district at 23.7 million fish. To date, all indicators pointed to a strong run that should not drop right off. For this reason, the Kvichak Section was allowed to fish from 11:00 a.m., July 7 until 10:00 p.m., July 7.

Wood River tower counts picked up dramatically July 7, and it appeared that fish were building in the entrance and outer district at Ugashik. There were still many reports of fish outside the districts in the first rip offshore. At 3:00 p.m., an announcement was made extending Naknek Section until 11:00 p.m., July 8, and the Kvichak Section was extended for set gill nets only until 11:00 a.m., July 8. Again, there were a few radio calls, but far fewer than the first set-net-only announcement. Catches in the set net areas above Libbyville on the east side and above Copenhagen Creek on the west side would indicate whether fish are entering the district and river immediately after a complete Kvichak Section opening. An aerial survey of the Kvichak River was flown at 4:00 p.m. and 1.2-1.3 million fish were estimated in the river. This estimate, coupled with the 2:00 p.m. tower count of 2.7 million gave a total escapement estimate of 3.9-4.0 million. Commercial catches in the district looked at least as strong as they were on July 6.

The Naknek-Kvichak District catch (9.4 million) and escapements (Kvichak = 2.9 million and Naknek = 1.5 million) through July 7 projected a total run of 23.6 million to the district. However, catches and escapements were apparently beginning to taper off and river test fish indices dropped from 4,000 and 5,300 on the afternoon tide of July 7 to 800 and 3,400 on the morning tide of July 8. An aerial survey of the Kvichak River indicated that the escapement was weaker than July 7, however, there should be at least two days of 0.5 million fish escapements or greater (1.0-1.1 million in river). This would bring the total

escapement to 4.3-4.4 million, more than a day ahead of the long term average.

Reports were received of many fish on the west side and in the first rip off the beach below Deadman Sands. Test fish indices increased on the afternoon tide to 1,000 and 3,500. Richard Russell flew the beach on the way to Egegik and saw numerous jumpers off the beach at Johnson Hill and at Middle Bluff. An opening was announced at 6:00 p.m. for fishing time in the Naknek Section from 11:00 p.m., July 8 until 11:00 p.m., July 9 and in the Kvichak Section for both gear types from 1:30 a.m., July 9 until 11:30 a.m., July 9. Fishermen were told to standby at 9:00 a.m., July 9 for further announcements. Reasons for the opening in the Kvichak Section were: (1) tower counts had increased to 29,000 per hour, (2) test fish indices were higher on the last tide than on the previous, (3) escapement past the tower was over one day ahead of the long-term average, (4) evidence existed of fish on the west side and in areas below the district, (5) an aerial survey indicated very good numbers of fish from the third index area upriver, (6) the run to date predicted a final run of 23.6 million to the district, and (7) additional fish should escape on the first of the evening flood.

River test fish indices (3,000 and 2,400) on the early morning tide of June 9 had again increased, compared to indices on the last two tides. The Kvichak River escapement past the tower through June 8 was 3.5 million, still more than one day ahead of the long-term average. The projected total run to the district, based on district catch and escapement figures to date, now totaled 24.0 million fish. Daily catches and escapements were still not declining significantly. At 9:00 a.m. an announcement was made for fishing in the Kvichak Section with set gill nets only from 11:30 a.m., July 9 until 11:00 p.m., July 9 and fishermen were asked to stand by at 3:00 p.m. for any further announcements. Results form a Kvichak River survey showed good fish in the upper index area and up through Kaskanak Flats, and fair numbers below.

The district was surveyed on the ebb tide. Catches seemed fair in the upper Kvichak Section just out from the river mouth, and at Pederson Point in the Naknek Section. Apparently fish previously observed on the west side had started to back out, but before another drift net opening could be permitted we needed to see good indices at the river test fish site. The decision was made to close

the entire district at 11:00 p.m.. This closure would hopefully allow a substantial number of fish to enter the Kvichak River. The Naknek River run should have been slowing down considerably by this date and hopefully a large push of fish would not enter the river during the 1-tide closure. The fleet had been fishing continuously in the Naknek Section for three and a half days. Battles at the Johnson Hill Line became fiercer as soon as the fish available on the west side were harvested (very few fish were getting into the inner and upper district).

An announcement was made at 8:00 p.m. to allow fishing in the Naknek Section from 1:45 p.m., July 10 until 1:45 p.m., July 11, and to allow fishing with set net gear in the Kvichak Section for the same 24-hour period. This opening for set nets only was based on much the same criteria as the previous set net openings. The Kvichak River tower escapement as of 6:00 p.m., July 9 totaled just over 3.9 million, still over one day ahead of the long-term average. If the run continued at the present rate, set net catches should not harm the escapement. Fishing the drift net fleet, on the other hand, could be detrimental if the run declined faster than normal.

The Kvichak River test fish boat did not get good drifts the evening of July 9, but did get fair indices of 2,600 and 1,600 the morning of July 10. The next two tides were not fished at the test site due to weather conditions and mechanical difficulties. The commercial sockeye harvest through July 9 was estimated at over 11.2 million, nearly double the forecast. Catch and escapement figures were still projecting a total run to the district of 24.6 million. The total district run was currently estimated at 17.9 million, leaving approximately 6.7 million still to arrive. Escapement at the tower through 2:00 p.m. totaled over 4.4 million and fish were passing at rates up to 33,000 per hour. An aerial survey of the river showed good strength from Kaskanak Flats up and mediocre strength down river. Signs of fish still existed below the lower index area across from Levelock and below the Branch River to Graveyard. The total escapement at that time was probably in excess of 5.0 million.

A survey of the commercial district showed good catches at the Johnson Hill line and fair catches off the Naknek River mouth and Pederson Point. Set nets should have had fair to good catches, since the section was not opened to drift nets. However, only set nets at Graveyard were showing any success. If fishing was

allowed for the entire west side on the afternoon tide tomorrow, July 11, four tides will have elapsed since the last opening, allowing adequate escapement (estimated to be 300-400,000) into the river. This would bring the estimated escapement total to 5.5 million, a level at which the additional 0.5 million needed to reach the escapement goal would probably escape even with a fishery in progress. At 8:00 p.m., an announcement was made to extend the Naknek Section an additional 24 hours, and Kvichak fishermen were asked to standby at 9:00 a.m., July 11 for any fishing in that section. The decision to fish in the Kvichak Section would be based mainly on river test fish catches.

Commercial catches remained strong and the daily catch on July 10 was estimated at 0.9 million. That brought the cumulative district harvest to nearly 12.6 million, more than double the preseason forecast. The Kvichak River escapement through July 10 included 4.7 million past the tower and 0.6 million in the river and totaled 5.3 million. Projections from catch and escapement figures at that time indicated a total run of 25.0 million to the district; the actual run through July 10 was estimated at 19.5 million. Because the river test fish boat was not able to fish, an announcement was made at 9:00 a.m. to allow set net fishing in the Kvichak Section for an additional 24 hours until 1:45 p.m., July 12. Fishermen were asked to stand by at 3:00 p.m.. Tower counts had begun to slow and an aerial survey flown at 1:00 p.m. showed good numbers of fish in and around the lower index area and fair numbers throughout the remainder of the river. A cursory survey of the fishery showed fair catches in the upper Kvichak set nets on the ebb. Apparently fish were holding on the low water, and would shoot up on the flood just ahead of any fishery tomorrow. An announcement was made at 3:00 p.m. to allow fishing in the Kvichak Section with both gear types from 2:45 a.m., July 12 until 1:45 p.m., July 12, and Kvichak fishermen were asked to standby at 9:00 a.m. for anything further. Naknek fishermen were asked to standby at 8:00 p.m., and the Naknek Section was then extended until 3:45 p.m., July 13.

River test fish indices were high (5,300 and 6,400) the evening of July 11, and the crew reported heavy fish sign the morning of July 12. The Kvichak River tower count through 6:00 a.m., July 12 totaled over 5.1 million with an additional 0.7 million or so in the river. The sockeye run through July 11 totaled 20.8 million. A revised in-season projection based on catch and escapement figures now forecasted a total run of 25.3 million. Kvichak

escapements appeared to be on target based on the large indices at the river test fish site and the present passage rate at the tower. An opening was announced for the Kvichak Section from 1:45 p.m., July 12 until 1:45 p.m., July 13, and fishermen were asked to standby at 8:00 p.m.. The river was surveyed at 4:00 p.m. and an estimated 0.8-1.0 million fish were observed. A survey of the commercial district showed scattered effort and a few good catches. The Kvichak Section opening was extended further at 8:00 p.m. to coincide with the Naknek Section opening. Both sections were scheduled to close at 3:45 p.m., July 13.

At 9:00 a.m., July 13 an announcement was made to extend the Naknek Section opening until the end of the emergency order period. The Kvichak Section was extended until 3:00 a.m., July 14 to reassess escapement and to verify the 6.0 million goal before allowing continuous fishing. River test fish indices dropped steadily from July 11 but fish were still entering the escapement. An aerial survey at 4:00 p.m. produced an estimate of 0.5-0.7 million and the tower count at 2:00 p.m. totaled over 5.6 million. Thus, escapement in the Kvichak river would apparently reach the goal for that system. The commercial catch appeared to be slowing down considerably. Since the estimated escapement had reached the goal, an extension for the Kvichak Section was scheduled until 3:00 a.m., July 15. By noon, July 14 more than 6.0 million sockeye had passed the tower and at 3:00 p.m. the Kvichak Section was extended until the end of the emergency order period.

The preliminary sockeye harvest for the entire district totaled over 17.1 million and was the highest since the 1983 catch of 21.6 million (Table 4 and Appendix Table 5). The final sockeye escapement in the Kvichak River totaled 7.0 million and the sockeye escapement in the Naknek River more than doubled the goal for that system at 2.1 million. Aerial surveys of the Branch River spawning grounds produced an estimated escapement of 169,000 sockeye to that system. The sockeye run to the district totaled 26.4 million, approximately double the preseason forecast.

The fishing schedule following the emergency order period is five days per week. However, late season fishing effort has grown dramatically throughout the past three years. A survey of the district on July 24 showed 180 drift boats and 190 set nets fishing, 50 units more, of each gear type, than at the same time in 1989. With the increased effort, it was not possible to obtain the desired pink

and coho escapements in the normal weekly closures. An emergency order, effective at 2:00 p.m., July 27, reduced the weekly fishing schedule to four days for the remainder of the salmon season.

The pink harvest totaled 448,000 fish, the fourth highest catch in the past 20 years (Table 5 and Appendix Table 8). Escapement was considered adequate in the Branch and Kvichak Rivers at 241,000 and 47,000 fish, respectively. However, escapement in the Naknek River was lower than expected and totaled only 65,000 fish. The coho harvest dropped to 13,000, following two years with harvests greater than 20,000 (Appendix Table 9). No escapement surveys are flown for coho. The chum harvest totaled 425,000 fish, the third highest in the past 20 years (Appendix Table 7). The chinook run was weak throughout Bristol Bay and the run to Naknek-Kvichak District provided no exception. The commercial harvest of 3,700 chinook was the second lowest since 1975 (Appendix Table 6). Escapement was average in the Naknek River due only to an in-season sport fish closure to the taking of large chinook. The Branch River escapement was less than average at 3,300 chinook.

Processing capacity was strained for several days during the peak of the season with several processors on limits and/or suspending operations for various periods of time. A total of 28 buyers purchased fish in the Naknek-Kvichak District in 1990 (Table 35). Approximately 61% of the fish caught in the district were frozen while 0.4% were canned and 16% and 11% were flown and tendered out, respectively (Tables 36 and 37).

Subsistence catches are shown in Table 40 and do not reflect anything out of the ordinary.

Egegik District

The 1990 sockeye salmon run to the Egegik District totaled 12.3 million fish, the largest run on record (previous high was 10.3 million fish in 1989)(Table 4 and Appendix Table 21). The run more than doubled the preseason forecast of 5.6 million and yielded a commercial harvest of 10.1 million, the largest ever recorded for the 96-year history of the fishery, (Table 1). An escapement of 2.2 million sockeye was attained, also the largest on record. Total sockeye runs during comparable cycle years dating back to 1955 have ranged from 0.9 to 8.6

million fish and average 3.9 million, thus the 1990 run ranks as the largest on record for this cycle-year (almost three times the cycle-year average).

The 1990 preseason forecast suggested the Egegik District would have the second largest harvestable surplus of sockeye salmon in Bristol Bay, roughly 4.6 million fish, behind only the 5.8 million harvest predicted for the Naknek-Kvichak District (Table 1). Thus the fishing public showed considerable interest in the management philosophy to be employed for the season.

During the February 1990 Board of Fisheries meetings several regulatory changes affecting the Egegik District were adopted, aimed primarily at reducing the interception of non-Egegik sockeye salmon stocks in the district. The West boundary of the district was moved shoreward from the 9990-Z-45140 Loran C line to the 9990-Z-45135 line, and the South boundary was moved northward from the 9990-Y-32630 Loran C line to the 9990-Y-32620 line. These adjustments reduced the overall size of the district by 18% from roughly 50 square mi to approximately 41 square mi. Over the 96-year history of the fishery the district has only been smaller on two occasions (1962 and 1963). The Board also supported moving Egegik District boundaries farther inshore if adjoining districts should experience a biological crisis, and Egegik interception was found to be contributing directly to the problem. Subsequently, Egegik boundaries would revert to their original configuration if the crisis in the adjoining district abated to the point that commercial fishing was allowed to resume in that district. Additionally, the Board moved the onset of the emergency order period in the district ahead a week from 9:00 a.m., June 23 to 9:00 a.m., June 16, providing a greater level of protection to early sockeye salmon bound both for Egegik and adjacent districts. One other Board action, directed solely at the Egegik District, provided that commercial fishing periods would be alternated with closed periods throughout the emergency order period (no continuous fishing), even after the sockeye escapement goal at Egegik had been attained.

The 1990 salmon season began in the Egegik District on June 1. Initial salmon landings were recorded June 4 with only a few chinook salmon present in the earliest catches (Table 16). The first sockeye catches occurred during the week of June 11-15. Early season fishing interest was quite high as indicated by the 240 drift fishermen registered for the district June 13 (Table 14). Small daily catches were recorded throughout the first two full weeks of fishing (June 4-15)

as only a few buyers were present and the fleet was just getting geared-up. The fishery went on emergency order management at 9:00 a.m., June 16 and the fleet was notified that at least one commercial opening would occur during the interval previously known as "Free Week" (June 16-23). As of 9:00 a.m., June 16, the harvest totaled approximately 10,000 sockeye, 500 chinook, and 1,300 chum salmon.

Test fishing is conducted in the lower river near Wolverine Creek to provide daily estimates of sockeye passage into Egegik River (Table 29). Test fish operations began June 12. The Egegik River salmon counting tower began operations on June 21 (Table 26). The tower is operated to provide daily estimates of sockeye passing into Becharof Lake.

The commercial fishery remained closed through the onset of the emergency order Period. This closure also provided protection for chinook salmon entering the Egegik escapement (based on chinook catches during the June 4-15 interval the chinook run did not appear strong). Sockeye salmon numbers in the lower portion of Egegik River increased slowly. By June 20 the inriver test fishing results indicated that approximately 13,000 sockeye had entered the lower portions of Egegik River (Table 29). With an estimated 10,000 sockeye already accounted for in the commercial harvest through June 15, this level of escapement was sufficient to justify an early fishing opening (0.8:1 sockeye catch to escapement ratio). Thus, a 10-hour fishing period was announced for June 21 (Table 13).

The June 21 fishery lasted from 8:30 a.m. until 6:30 p.m. and yielded a commercial catch of 69,000 sockeye, 100 chinook, and 1,300 chum salmon. This level was quite a bit below harvests on the same day in both 1989 and 1988 (171,000 and 292,000 sockeye, respectively), but well above the 1960-87 average of 28,000 fish. Most of this catch was reportedly taken by drift gill nets near the south Egegik line. Sockeye harvests to date in the South Unimak and Shumagin Islands intercept fisheries were not encouraging (fishermen were working very hard with extended fishing time and were barely reaching harvest quotas), but early Port Moller test fish catches were indicating higher sockeye indices than usual. Thus, managers were having to sort through mixed signals regarding the overall sockeye run strength at this point in the season. The Egegik District catch and escapement performances to date were not overly impressive so caution was warranted until escapement rates increased to a level that would justify further fishing. The fishery remained closed for the next several days.

The first sockeye arrived at the Egegik River counting towers on June 22. Small numbers of fish passed the towers for the next few days as inriver test fishing results began to improve (Table 29). By 6:00 p.m., June 27, an estimated 83,000 sockeye were believed to have passed through the district into the river (3,600 of which had been counted past the towers), and reports from observers in the district indicated a large number of fish were present in the inner district waters (in front of Egegik village). It appeared that the desired escapement level from the early part of the run (100,000 sockeye) would be achieved, and a 10-hour commercial opening was announced for June 28-29.

The June 28 opening commenced at 5:00 p.m. under foggy skies and light westerly winds. Catches in set nets appeared to be low while drift boats, particularly in outer district waters, reported modest success. The period closed at 3:00 a.m., June 29 and yielded a catch of 323,000 sockeye, 2,500 chum, and less than 100 chinook salmon. This brought the cumulative sockeye harvest to 448,000 fish, 10% of the preseason harvest projection.

The fishery remained closed for the remainder of June 29 and June 30 while escapement indicators increased slower than expected. The large showing of sockeye visible in front of Egegik village on June 27 did not materialize in the strength expected farther upriver June 28-29. These fish must have backed out of the inner district. The cumulative escapement past the counting towers as of 6:00 p.m., June 30 totaled 39,000 sockeye, well below the historic average of 71,000 for this point in the run. An aerial survey of Egegik lagoon added only 9,000 fish to the total, so either fish were holding downriver in murky water areas or estimates of inriver fish were too high. Caution was prudent regarding authorization of additional commercial fishing time.

Inriver test fishing indices increased substantially on the morning of June 30 and then decreased on the evening flood tide. The indices climbed to the highest levels of the season on the morning tides July 1 (Table 29). These high indices were reported to managers at 11:15 a.m., July 1 and, consequently, resulted in a 12-hour commercial opening announced for the morning of July 2, rather than the evening of July 1. An aerial survey of Egegik River and lagoon late in the afternoon of July 1 confirmed the presence of approximately 188,000 sockeye in areas downstream of the counting towers. The cumulative Egegik River tower count through 6:00 p.m., July 1 totaled 73,000 sockeye so approximately 261,000 were

visually accounted for (26% of the escapement point goal). Numerous jumpers were observed during the aerial survey in the Egegik District and north along the coast to Johnson Hill in the Naknek-Kvichak District (n = 255).

The July 2 opening commenced at 6:00 a.m. under calm, sunny conditions with 592 drift boats and 262 set nets participating (peak drift and set net effort observed this season). Initial catch success appeared to be very good in inner district set nets and in drift nets immediately in the Egegik Bay entrance areas. Catch success in set nets along outer bay beaches appeared more modest. The fishing period closed at 6:00 p.m., July 2. The combined fleet caught 1,205,000 sockeye, 7,000 chum, and less than 100 chinook during this opening. That brought the cumulative catch to approximately 1.7 million sockeye (36% of the forecast harvest), 12,000 chum, and 800 chinook.

The escapement count at Egegik River tower increased rapidly on July 2, reaching a cumulative total of 306,000 sockeye by 6:00 p.m.. Inriver test fishing indices also remained high so a 12-hour fishing period was announced for July 3. This opening was scheduled to occur on a daytime 15-ft flood tide following a 1-flood closure. Commercial openings at this point in recent years have generally followed a 3-flood closure, but in this case it was necessary to stop the surge of fish into the river.

The July 3 opening commenced at 7:00 a.m. under calm, foggy conditions. An aerial survey of the district and river was conducted late in the morning. Poor catch success was observed in the inner district set nets, while drift nets were doing moderately well in outer district waters. It was apparent the surge of fish into the inner district had been curtailed. Approximately 219,000 sockeye were observed upriver of the fishery in the Egegik River and lagoon. The inriver component was added to the 354,000 fish counted past the towers, visually confirming a total of 573,000 fish in the escapement (approximately half the desired point goal). The fishery closed at 7:00 p.m., July 3 to allow the next wave of fish to disperse throughout the inner and outer district waters.

The July 3 catch at Egegik totaled 1.1 million sockeye and 7,400 chum salmon, bringing the district cumulative sockeye harvest up to 2.8 million fish. By this point the harvest in the Naknek-Kvichak District had reached 5.5 million sockeye and the Ugashik district harvest was just getting underway (204,000 fish). No

stock separation results of Egegik sockeye catches were available, but it was apparent that the runs to the north were not depressed. The Naknek River escapement goal had already been achieved and the Kvichak escapement was progressing ahead of schedule. So no compelling reason existed not to fish in the Egegik district fairly aggressively.

Egegik River tower counts continued to climb rapidly on July 4, reaching a cumulative total of 836,000 sockeye by noon (a level historically reached 14 days later). Based on this unusually high escapement rate an 11-hour fishing period was scheduled to commence at 9:30 p.m., July 4. By 7:00 p.m., July 4, the Egegik River tower count had reached the desired Egegik District escapement point goal of 1.0 million. The 48-hour transfer period was waived effective at 8:00 p.m., July 4. An aerial survey of the district early in the afternoon of July 4 confirmed the presence of large schools of salmon in the outer district and South channel, so the opening was expected to be productive.

The July 4 opening was good for fishermen working the inner bay waters. Very good drift and set net catches were made in the South Channel area. The opening occurred on an 18.9-ft flood tide and lasted until 8:30 a.m., July 5. The catch totaled 874,000 sockeye, bringing the cumulative sockeye harvest up to 3.7 million fish (80% of the preseason projected harvest). One major floating processor announced to his fleet that his available capacity had been reached, and that buying operations would suspend until processing capacity returned to normal levels.

Normally, once the escapement goal has been achieved, the commercial opening would be extended until further notice. However, the new regulations in effect for the Egegik district directed management to continue alternating openings with short closures to ensure that fish would distribute throughout the district, and, thus, be available to both inner and outer district fishermen at the next opening. With this in mind, managers planned for a 2-tide closure prior to the next opening (July 6). However, shortly before announcing this decision to the fleet at 8:00 p.m., July 5, sources within the district reported a large and rapid movement of sockeye into the district from the north. Considering that the cumulative escapement at this time totaled 1.2 million fish (the desired upper escapement range) and that additional fish could quickly pass into the river if the surge inshore continued through the night, the 8:00 p.m. announcement was

revised and the fleet was granted a short-notice, 23-hour fishing period, commencing at 10:00 p.m., July 5 on an incoming 19.1-ft flood tide.

The July 5-6 fishing period at Egegik was a very productive one, with 490 drift boats and 253 set nets taking part. The opening yielded a catch of 1.2 million sockeye, which brought the cumulative sockeye harvest up to 4.9 million fish, slightly greater than the preseason harvest forecast. While some of the participants were temporarily disadvantaged by the short notice (2-hour lead-time) provided for the opening, most were glad to catch the available fish. The management objective of preventing a surge into the escapement at this juncture was achieved. The fishing period closed on schedule at 9:00 p.m., July 6. Two major shore-based buyers joined the above-mentioned floating processor by placing their fishermen on catch limits July 6 due to processing capacity limitations.

The cumulative escapement at the Egegik River towers through 6:00 p.m., July 6 totaled 1.3 million fish, so a 24-hour fishing period was announced to commence at 10:30 a.m., July 7. A 1-flood tide interval was allowed between open fishing periods in this instance and the opening was scheduled to occur on a 13.1-ft flood tide.

The July 7 opening occurred under light SW winds and overcast skies. Good drift net catches occurred throughout the outer district and directly into the bay entrance. Set nets did well along the outside north beach and South Channel. Set nets from Coffee Point and Egegik village upstream reported poor catch results and were generally unhappy with the small flood tide opening. The smaller flood tides were expected to be less than 14 feet each for the next 4 days, so the opening was extended another 12 hours until 10:30 p.m., July 8 to enable use of the bigger flood tides on the next series of openings. Overall, the 36-hour opening yielded a sockeye catch of 1.4 million fish, bringing the district cumulative harvest to 6.3 million fish.

The sockeye escapement at Egegik tower had reached 1.4 million fish by 9:00 a.m., July 9. To the north, catch in the Naknek-Kvichak District totaled 10.3 million sockeye and escapements there were ahead of long-term average rates. To the south, the Ugashik District sockeye catch totaled 573,000 fish and escapement past Ugashik River tower totaled 17,000 fish, with 100,000 more indicated in the Ugashik River downstream. Thus, there was no justification to adjust the fishing

time in the Egegik District for conservation reasons. The district fishery remained closed July 9, allowing two flood tides to disperse fish throughout inner and outer district waters. It was then re-opened at 12:30 a.m., July 10 for a 23-hour period. This opening occurred on an early morning 19.7-ft flood tide followed later by a 12.7-ft evening flood tide. The opening was very productive and yielded a catch of 1.2 million fish. Catch success was reportedly very good in inner district waters and fair-to-good in outer district areas. Some increase in escapement into the river accompanied the 2-flood closure; inriver test fish indices increased over values obtained the previous four days (Table 29), but not to the point that it was considered detrimental (one of the management goals for the district is to obtain representative portions of the escapement from all segments of the run). Based on the success of the previous 2-flood closure followed by a big flood tide fishery, the fishery was allowed to close on schedule at 11:30 p.m., July 10 and the rotation was repeated. The next 23-hour opening was scheduled for 2:00 a.m., July 12 on an incoming 19.5-ft flood tide.

The July 12 opening occurred under nearly calm conditions. Aerial observations at 9:00 a.m. indicated good catches in set nets in nearly all beach areas and in drift nets near the north line. A total of 455 drift boats and 245 set nets were operating in the district. The fishery lasted until 1:00 a.m., July 13 and yielded a catch of 1.0 million sockeye. This brought the cumulative district catch up to 8.5 million sockeye, nearly twice the preseason harvest projection. The escapement past Egegik River tower through midnight July 12 totaled 1.7 million sockeye, 500,000 fish greater than over the upper range of the escapement goal.

Catch success on both July 10 and 12 was good and preliminary reports from the buyers indicated that success for both gear types was high. Set net fishermen had delivered over 100,000 fish on each of the last two big flood openings that followed 2-flood closures, indicating that fish were dispersing throughout the inner and outer district during the closures (they were delivering only 40-50,000 fish on the earlier 1-flood closures). With that success as a contributing factor, another 2-flood closure was instituted and the next fishing period (24 hours) was scheduled for 3:00 a.m., July 14.

The July 14 opening occurred under relatively calm conditions with 540 drift

boats and 246 set nets participating. Catch success observed during an aerial survey at 9:00 a.m. was noticeably less than during the preceding opening. The period lasted until 3:00 a.m., July 15, and yielded a catch of 533,000 sockeye (Table 16). With the escapement at Egegik River tower totaling 1.9 million sockeye through midnight July 14 (700,000 fish above the upper escapement range) and the cumulative commercial sockeye harvest totaling 9.1 million (4.5 million fish over the preseason district harvest forecast) the fishery was allowed one last 2-flood closure and was then opened at 5:00 a.m., July 16 for the remainder of the emergency order period. Again the 2-flood closure was in response to the Board of Fisheries directive, as outlined in 5AAC 06.365 Egegik District Allocation Plan, to disperse fish throughout the district so that all gear groups had access to them. The July 16-17 period yielded a catch of 486,000 sockeye.

The emergency order period expired at 9:00 a.m., July 17, and the district fishery reverted to a fixed fishing schedule of four days per week (9:00 a.m., Monday through 9:00 a.m., Friday). July 17 fell on a Tuesday and the sockeye escapement achieved by that date (2.1 million fish) was well in excess of the escapement goal. Thus, an emergency order was issued extending fishing through the scheduled weekend closure of July 20-23. The fishery ran uninterrupted from 5:00 a.m., July 15 through 9:00 a.m., July 27.

Sockeye landings in the district continued throughout August and into early September (Table 16), reaching the season total of 10,086,953 fish. Sockeye escapement at Egegik River tower continued through July 25, reaching the total of 2,191,362. Aerial surveys of Shosky Creek and King Salmon River added another 220 fish, bringing the total escapement in the Egegik drainage to 2,191,582 sockeye. The peak daily passage at Egegik tower occurred from July 2-4 and averaged 315,000 fish. Each segment of the run was represented in the escapement, although that portion occurring prior to June 30 was weaker than usual. The sex ratio in the escapement was 43% males to 57% females.

Most of the 1990 Egegik District sockeye run were progeny of the 1985 escapement of 1.1 million fish. The age composition of the 1990 sockeye run was as follows:

Age Group	Catch	Escapement
1.2	12%	25%
2.2	32%	42%
1.3	12%	5%
2.3	42%	25%
Other	2%	3%
Totals	100%	100%

Fishermen harvested 82% of the Egegik District sockeye run, well above the 39-year average of 73% (1952-90). This marked the ninth year in the last 10 that exploitation has exceeded 75%. Preliminary catch data indicates drift gill nets took 90% of the sockeye harvest while set gill nets took 10%. Historically, (1960-89), drift gill nets have taken an average of 87% of the catch in Egegik while set gill nets have averaged 13%. In spite of a lower catch percentage in 1990, the set net fleet delivered the second largest volume of sockeye on record for that gear type (approximately 980,000 fish; record = 1,012,000 in 1981). Peak day in the harvest, based on volume landed (1.2 million sockeye), catch per hour, and catch per unit effort was July 2.

During the emergency order period (June 16-July 17), a total of 212 hours were fished in the district, 28% of the 744 hours available. This total was down from 307.5 hours fished in 1989.

The commercial harvest of other salmon species totaled 181,000 fish, 2% of the total district harvest. The chinook harvest totaled just over 1,000 fish, the lowest catch since 1975, and far below the 20-year average (1971-90) harvest of 3,000 (Appendix Table 6). Part of this drop in chinook harvest was due to the reduction in fishing time during the June 16-23 period. Historically, 31% of the chinook harvest occurred during this time period. Even after accounting for these missed fish, however, the chinook run was weak. The district chum harvest totaled 128,000 fish, the fifth largest on record (Appendix Table 7). The pink harvest totaled approximately 7,000 fish, the sixth largest on record and well above the 1971-90 even-year average of 4,500 (Appendix Table 8). The district coho harvest totaled 44,000 fish, right at the 10-year average (Appendix Table 9).

Aerial surveys were conducted in the Egegik and King Salmon River drainages to provide escapement indices for chinook, chum, pink, and coho salmon (ADF&G 1990,

in press). The resultant escapement indices totaled 968 chinook, 9,202 chums, 17,000 pinks, and 13,400 coho. Chinook indices in 1990 were similar to 1989 levels while indices for the other species were above those of 1989. However, compared to the 10-year average, this year's indices were lower for all species except pinks (1981-89 mean index = 1,324 chinook, 17,993 chums, 14,375 pinks, and 13,774 coho). These data indicate the chinook run is still struggling (low catch and escapement). The chum run is doing well overall, but emphasis on harvesting the large sockeye run results in less than desired chum escapement levels. The pink and coho runs are also doing relatively well. To be on the safe side, however, the commercial salmon fishery was closed September 8 for the remainder of the season (until Sept. 30) to protect late-run cohos and boost escapement rates.

A total of 32 buyers operated in the district, four more than in 1989 (Table 35). Most of the harvest was delivered to floating freezer processors or tendered to other districts. One old cannery in the district was renovated and operated as a freezer plant this season, but there were no other additional shore-based buyers. Fleets of at least three companies were placed on daily limits or temporarily released to sell elsewhere several times during the peak of the sockeye fishery, when buyers reached their processing capacity. This was inconvenient for fishermen but it did not result in any known wastage of fish. Other buyers were able to handle the extra volume.

Research activities were again conducted in the Egegik District to provide stock separation data and to test different sectors of the district for stock compositions and temporal trends. Results of these studies are still being analyzed and will be reported separately in the spring of 1991. Hopefully, the results will provide a clearer understanding of interception patterns in the district and yield a basis for future management actions in reducing interception.

The major regulatory changes implemented in the district this season did not disrupt the overall success of the sockeye fishery. Both a record harvest and a record escapement were achieved. Crowding due to the smaller district size was not noticeably increased over previous years. Alternating openings with closures after the escapement goal for sockeye had been achieved resulted in heartburn for some fishermen, especially since the escapement eventually exceeded the goal by

1.2 million fish. However, it resulted in a more even distribution of catch throughout the district and between gear types (continuous fishing would have caused a great disparity in catch between outer and inner district fishermen as nearly all the fish would have been caught at or near the outer district lines). It also helped attain representative escapement portions from all segments of the run, provided some opportunity for non-district fish to migrate farther north or south, contributed to the escapements of chinook and chum salmon, provided processors some extra time to handle the record product volume, and helped enforcement personnel in conducting their operations. The earlier onset of the emergency order period had a beneficial effect on the chinook escapement. Chinook escapement indices were similar to those of 1989 in spite of a weaker overall run in 1990. It didn't seem to affect fleet size to any great degree and did not generate much comment from the fishermen.

Had the opening on the morning of July 2 been permitted instead on the evening of July 1 there might have subsequently been a shift from the escapement to the harvest, but there is no way to know how it would have affected later fishing schedules or escapement rates. Overall, the season in Egegik district was very successful.

Ugashik District

The 1990 sockeye salmon run to the Ugashik District totaled 2.9 million fish, slightly less than the preseason forecast of 3.1 million fish (Table 1). Fishermen harvested 2.1 million sockeye, the sixth largest harvest on record during the 107-year history of the fishery, and 749,000 fish entered the escapement (slightly over the escapement point goal of 700,000)(Table 4). Comparable cycle-year sockeye runs dating back to 1950 have ranged from 0.3 to 7.5 million fish with an average of 2.5 million, so the 1990 run was slightly greater than the cycle year average.

The preseason forecast for the Ugashik District was quite optimistic, suggesting a harvest of over 2.4 million sockeye. Compared to much larger harvest projections in the Naknek-Kvichak and Egegik districts, this was not attractive enough to generate a large amount of early interest in the district. Fishermen were aware that management the district would be similar to that of 1988 and 1989, with few openings until fish arrived in force in the lower portions of

Ugashik River. Thus, most chose to begin the season elsewhere with the option of transferring into Ugashik as conditions warranted. There were no major regulatory changes directly targeting the district for the 1990 season.

Initial landings occurred in the district June 4 (Table 17). Small catches were reported during the remainder of that week and the following week (June 11-15) as only a few fishermen worked their gear. This week traditionally includes the peak chinook harvest (June 15), but daily sockeye catches were already surpassing chinook catches, indicating fishermen were probably using sockeye gear rather than the larger chinook web.

By the week of June 18-22 the Ugashik fleet had grown to 75 drift gill nets and 12 set nets (Table 17). This increase was due to the transfer of some fishermen from Egegik to Ugashik (those who were uncertain about the Egegik District fishing schedule under its earlier emergency order management). The effort increase resulted in increased harvests of sockeye and chum salmon, and the Ugashik fleet was definitely targeting the higher value sockeye passing through the district. By the onset of the emergency order period at 9:00 a.m., June 23, the cumulative district harvest totaled approximately 48,000 sockeye, 1,500 chinook, and 2,600 chum salmon, well below 1989 levels for the same date.

The river test fishery, which provides daily estimates of sockeye passage into the lower section of the Ugashik River, began operations June 20 about three mi upstream of Ugashik village (Table 30). Initial drifts were "water-hauls." Daily inriver test fishing throughout the next several days documented a very low level of fish entering the Ugashik River system, so the commercial fishery remained closed. During this time some of the drift gill net fishermen transferred from the Ugashik District to other areas to take advantage of early fishing elsewhere prior to the arrival of the main Ugashik run.

The fishery remained closed through the end of June as inriver and district test fishing (Tables 10 and 30) showed little evidence of sockeye moving into inner district waters.

District test fishing July 1-2 indicated sockeye were arriving in outer district waters but not moving into Ugashik Bay in any significant numbers (Table 10). The Ugashik River counting tower began operations July 3 with a few fish passing

immediately (Table 26). District test fish indices picked up slightly on July 3 especially near the southern entrance to Ugashik Bay (South Spit). As additional fish were sighted passing up the South Channel, at Muddy Point, and in front of Pilot Point, it appeared that the Ugashik sockeye run had finally begun to materialize and move inshore. As the fishery had been closed for 13 days awaiting fish in the inner district, and the fleet included only 93 drift boats (Table 14), a 12-hour fishing period was announced for July 4.

The July 4 period commenced at 8:00 a.m. under the influence of SE winds at 15-25 kn. An aerial survey conducted at 1:30 p.m. confirmed 92 drift gill nets and 57 set nets fishing, with 18 tenders in attendance. All outer district drift and set nets appeared to be doing well, but inner district set net success was marginal. Ugashik village set nets were doing poorly indicating no large surge of fish had occurred into the river, so the fishery closed on schedule at 8:00 p.m., July 4. This opening yielded a catch of 218,000 sockeye, only a few chinook, and 2,200 chum salmon (Table 17).

The fishery remained closed July 5 as fish sign in the district decreased. Inriver test fishing indices remained low (Table 31) and tower counts were still minimal. To keep tabs on the status of fish abundance in the district a test boat was dispatched to fish selected stations in the district July 6.

By the evening of July 6 the district test boat was reporting good fish abundance in outer district waters, but mediocre success for inner Ugashik Bay stations. Inriver test fishing upstream of Ugashik village was beginning to improve but a strong signal indicating significant movement of fish into the lower portions of Ugashik River was absent. The fishery remained closed.

The inriver test fish indices continued to climb July 7, yielding an escapement estimate of 74,000 sockeye past the fishery. The district test boat fished again July 7 working only inner district stations. Test fish catches indicated a fairly high level of sockeye abundance passing through the inner district into Ugashik River. The fleet registered in the district was still moderate (142 boats) and a surge of fish appeared to be progressing into the escapement, so a 12-hour fishing period was announced for July 8.

The July 8 fishing period commenced at 11:00 a.m. under sunny skies and SE winds

at 10 kn.. 146 drift boats and 70 set nets fished. Fishing success appeared good for drift boats near the Ugashik Bay entrance, fair-to-good for Pilot Point set nets, and good for Ugashik village set nets at 12:30 p.m.. Numerous jumpers were noted in both the inner and outer district in spite of the fishery. Based on these observations and the continued increase in the inriver test fish indices (Table 30), the fishery was extended 13 hours until 12:00 noon, July 9, and then allowed to close. The 25 hours of fishing July 8-9 yielded a catch of 739,000 sockeye, bringing the cumulative harvest up to 1.0 million fish (42% of the preseason harvest forecast).

Escapement past the Ugashik River tower through midnight, July 8 totaled 17,000 fish, well below the historic average of 43,000 for that date. However, test fishing indices July 9 suggested another 227,000 fish were present in the escapement downriver. With the historic peak of the fishery (July 11) approaching and the sockeye escapement proceeding a little slower than in some recent years the fishery remained closed July 10.

A district test boat was dispatched July 10 to fish selected Ugashik Bay entrance areas and inner bay stations. Catches would provide indications of fish abundance in those areas to detect a surge inshore should one develop. Results indicated a medium abundance of fish was continuing to enter the bay. By 6:00 p.m., July 10 the escapement count at Ugashik River tower had climbed to 57,000 sockeye and inriver test fish indices indicated another 265,000 were present between the tower and the fishing district. Thus, approximately 320,000 fish (45% of the escapement point goal) were believed to be safely in the river past the fishery. A 13-hour fishing period was announced for July 11.

The July 11 opening commenced at 12:01 a.m. under light SW winds. At 8:00 a.m., 256 drift boats (peak observed effort this season) and 62 set nets were participating in the fishery (Table 17). Catch success appeared to be fair-to-moderate in drift nets and only fair in set nets throughout most of the district. However, due to high inriver test fish indices continuing upstream of Ugashik village, the fishery was extended another 12 hours until 1:00 a.m., July 12, and then allowed to close. The 25-hour fishing period July 11-12 yielded a catch of 356,000 sockeye, bringing the cumulative harvest up to 1,367,000 fish.

Escapement past Ugashik tower through midnight, July 11 totaled 120,000 sockeye

(Table 30), slightly above the historic average (110,000) for this date. As the catch rate July 11-12 (historic peak day in the fishery) was only about half of the July 8-9 catch rate, the fishery was kept closed for the remainder of July 12 to allow the district to refill with fish. A district test boat was dispatched to survey selected stations July 13.

The district test boat fished nine stations in and near the district on July 13, and yielded low-to-fair abundance indices for all but one station (Table 10). An index of 1,140 at South Spit indicated some fish were schooled there preparing to move inshore. With only one attractive index from the district, the fishery remained closed July 13.

The escapement past Ugashik River tower through midnight, July 13 totaled 327,000 fish (47% of the point goal), and was now two days ahead of the historic average level. Inriver test fish indices were declining but were still indicating moderate passage rates into the river. With these indicators as a basis the fishery was re-opened for 12 hours beginning at 3:00 p.m., July 14.

The July 14 fishery opened under sunny, near-calm conditions with 244 drift boats and 69 set nets fishing. Catch success at 8:00 p.m. appeared to be very modest for both gear types with the best catches noted for drift boats in the bay entrance and out toward the west line. Based on these observations, the fishery closed on schedule at 3:00 a.m., July 15, yielding a catch of 263,000 sockeye. This catch brought the cumulative harvest up to 1.6 million fish, 69% of the preseason harvest forecast.

The fishery remained closed for the remainder of July 15 and July 16. Additional escapement was sought and another round of district test fishing was conducted to monitor fish abundance in district entrance areas. By noon, July 16 the escapement past Ugashik River tower totaled 510,000 sockeye, and inriver test fishing indicated another 80,000 fish were present farther downriver. So approximately 590,000 fish (84% of the escapement goal) were fairly well assured in the escapement. Historically (based on 48 years of data), the escapement through midnight, July 16 has averaged 359,000 sockeye, and a level of 510,000 fish has generally been reached on or about July 20. The current escapement appeared to be well ahead of schedule at this point, and a 4-hour fishing period was announced at noon, July 16 effective at 5:00 a.m., July 17. The emergency

order period was due to expire at 9:00 a.m., July 17, returning the fishery to a fixed fishing schedule. By opening the fishery at 5:00 a.m., July 17, both gear types would be able to simultaneously set their gear at a preferable tide stage (otherwise at 9:00 a.m., July 17 set nets would have to try setting out their gear at high water, a difficult procedure in some areas of the beach). District test fishing results available late in the evening of July 16 indicated another nice build-up of sockeye in the southern entrance to Ugashik Bay.

The July 17 opening progressed under nearly calm, sunny weather with 248 drift boats and 73 set nets participating. Now that transfer requirements had expired, some local residents were concerned that an influx of drift boats would inundate the district. In spite of these fears, no such increase materialized. The opening yielded 197,000 sockeye. Inner district set nets did noticeably better than the last couple of fishing periods, indicating another pulse of fish had moved inshore. This catch brought the cumulative harvest up to 1.8 million sockeye, 77% of the preseason harvest forecast.

The fishery reverted to a fixed fishing schedule (9:00 a.m., Monday to 9:00 a.m., Friday) effective at 9:00 a.m., July 17. By 9:00 a.m., July 19 the Ugashik River Tower count had reached 633,000 fish, with an estimated 110,000 more downriver. Thus, with the escapement point goal (700,000 sockeye) virtually assured, an announcement was made extending the district fishery from 9:00 a.m., July 20 through the weekend until 9:00 a.m., July 23. The fishery continued uninterrupted and closed for the weekend at 9:00 a.m., July 27.

Sockeye landings continued through September 7 (when the season was officially closed) to a final total of 2,144,268 fish, the sixth largest harvest on record. The sockeye escapement goal of 700,000 fish was reached July 26. Tower counts continued through July 29 and eventually totaled 730,038 fish. An additional 8,100 and 11,340 sockeye were counted during aerial surveys on August 13 in the Dog Salmon and King Salmon Rivers, respectively, bringing the total escapement in the Ugashik River to 749,478 sockeye. Peak day at the counting tower was July 13 with a daily tally of 119,000 sockeye. The sex ratio in the escapement was 51% males to 49% females based on approximately 2,600 fish sampled at the counting tower. Peak passage at the inriver test fish site occurred July 9, and at Ugashik River counting tower July 13, indicating a 4-day lag time between the two for the main body of the run.

Fishermen in the Ugashik District harvested 74% of the sockeye run in 1990, well above the 1949-90 mean exploitation rate of 59%. Peak catch and catch per hour occurred on July 9 (approximately 437,000 sockeye landed in 12 hours = 36,440/hour). Peak catch per unit effort in the district occurred July 4 for drift gill nets (2,004 sockeye per delivery) and July 9 for set gill nets (309 sockeye per delivery). Based on preliminary catch totals it appears drift gill nets took 91% of the sockeye harvest while set gill nets took 9%. The 30-year (1960-89) average percentages of the sockeye harvest by gear type are 91% drift and 9% set gill net, respectively. The fishery was open only 78 hours (14%) of the 576 hours available during the emergency order period.

Most of the fish were progeny of the 1985 escapement of 1.0 million fish (Table 3 and Appendix Table 21). Age composition of the Ugashik District sockeye run was as follows:

Age Group	Catch	Escapement
1.2	15%	22%
2.2	31%	38%
1.3	24%	24%
2.3	28%	13%
Other	2%	3%
Totals	100%	100%

The commercial harvest of other salmon species totaled 66,000 fish, approximately 3% of the total district harvest. The harvest of approximately 1,700 chinook was the smallest taken for that species since the 1976 harvest of only 300 fish (Appendix Table 6). It was less than half the 1971-90 average harvest of 3,500. Part of the reason for the small harvest was a weaker than average chinook run, but the relatively lower value for chinook also contributed (low volume, moderate price/lb), compared to the high value of the sockeye (high volume, high price/lb) in the district early in the season. This induced fishermen to use small mesh gill nets, targeting more heavily on sockeye than chinook during the peak of the chinook run in mid-June, and led to a smaller chinook harvest. The chum harvest totaled 32,000 fish, well below the 1971-90 average harvest of 53,000 (Appendix Table 7). The pink harvest totaled less than 300 fish, normal for an even cycle year (Appendix Table 8). The coho harvest totaled 32,000 fish, slightly below the 1981-90 average harvest of 38,000 (Appendix Table 9).

Aerial surveys were flown on the spawning grounds August 13 and yielded total escapement indices of 3,755 chinook, 11,270 chums, and 2,000 pinks (ADF&G 1990, *in press*). The chinook index was below the 1980-89 mean of 5,600 fish but the fish were well distributed throughout all major spawning areas. The chum index was far below the 1980-89 mean of 47,000 fish. This was largely due to a weak run, as very little fishing time was granted during the traditional peak of the chum run (the historic peak chum catch in the district has been July 16). The pink index was normal for a cycle year. Aerial surveys were also flown to document coho abundance in the mainstem Ugashik and King Salmon Rivers during the commercial coho season. Six surveys were flown August 7-September 4 yielding a total index of 12,610 fish. After considering the weaker coho runs occurring in other Bristol Bay districts and in the adjoining Cinder River Section of the North Peninsula District, and after experiencing problems with daily catch reporting by the major coho buyer in the Ugashik District, the commercial fishery was closed for the remainder of the season at 9:00 a.m., September 7. This closure was expected to yield enough additional fish in the coho escapement to bring it to approximately 20,000 fish.

A total of 23 buyers operated in the district during 1990, two less than in 1989 (Table 35). Nearly all the catch was either frozen on floating processors or tendered to other districts for processing. No new canning operations or freezer plants were operated in the district this season.

Overall, the season in the district was successful but not up to the expectations of the fishermen. The usual problem of trying to accurately assess escapement strength in the muddy waters of Ugashik River (downstream of the counting tower) was again present. The inriver test fishery gave a fairly accurate indication of relative passage strength and was much relied on. Ideally, some form of adult sonar that could be operated downstream of the Dog Salmon River mouth might give the manager a better picture of the escapement and may lead to greater precision in managing the harvest. The management precision this season, however, was the best in recent years.

Opinions were expressed by members of the Ugashik fishing fleet suggesting that the Egegik and possibly the Naknek-Kvichak District fisheries may have intercepted some Ugashik bound sockeye, but a determination will not be possible until the staff conducting the stock separation studies finish scale pattern

analysis in the spring of 1991.

Nushagak District

The preseason inshore forecast for the Nushagak District in 1990 totaled 3.5 million sockeye salmon. The forecast included 1.9 million for Wood River, 600,000 for Igushik River, and 900,000 for Nuyakuk River (Table 1). The projected inshore harvest totaled 1.8 million sockeye, well below the 10-year average of 3.6 million and considerably less than the 20-year average of 2.6 million (Appendix Table 5).

A variable escapement policy is in place for the Wood River system that allows fishery managers to adjust the sockeye escapement goal to optimize spawner distribution. Analysis of past age compositions have demonstrated that 3-ocean sockeye tend to spawn primarily in the rivers and creeks of the Wood River system, while 2-ocean sockeye spawn primarily on lake beaches. The variable escapement policy sets the desired escapement range at 800,000 to 1.2 million fish. Where the 3-ocean component is projected at, or found to actually exceed 60% of the age composition of the escapement, the goal may be reduced to 800,000 fish. If most of the escapement age composition is comprised of 2-ocean sockeye, the department may adjust the goal upward to 1.2 million. Age composition in the Wood River system in 1990 was projected at roughly 46% 2-ocean and 54% 3-ocean sockeye (Table 2). Therefore, fishery managers left the goal at 1.0 million.

The forecast for chinook salmon in Nushagak District totaled 116,000 fish, considerably less than the 20-year average run to this district (Appendix Table 1 and 31). The district escapement goal is 75,000 fish, the subsistence harvest averages 9,000 fish (Appendix Table 46), and the sport fishery also harvests chinook salmon. Therefore, the 1990 harvestable surplus for the commercial fishery was not expected to be great, and a directed chinook fishery appeared to be unlikely. However, chinook escapement rates were to be intensely monitored using subsistence catches on local beaches and at Lewis Point and sonar enumeration at the Portage Creek site.

Since a commercial chinook fishery in early June was unlikely, an emergency order was issued on May 25 allowing watershed residents the opportunity to harvest subsistence salmon in the commercial district from May 28 until June 20 (Table

13).

On June 9, a subsistence fisherman on Igushik Beach reported 22 sockeye and 3 chinook in his net. On June 19, a large number of sockeye were reported in the Igushik subsistence nets, so we elected to fly the first aerial survey of the 1990 season on June 20. Only 3 sockeye were observed in clear water areas of the Igushik River. However, 30 sockeye, 1 chinook, and several large schools of smelt were visible in the lower Kulukak River.

By June 22, some sockeye and chum salmon were beginning to appear in the subsistence nets on the local Dillingham beaches. So, the first test boat of the season was deployed to determine the relative abundance and distribution in the district (Table 11). This vessel failed to locate any concentrations of fish, but sockeye were caught on June 23 at 7 of 10 stations fished.

Subsistence fishermen on the Dillingham beaches did well on the morning tide on June 22; some caught over 100 fish. One net at Lewis Point reportedly caught 45 chinook on the morning tide. The sonar counts at Portage Creek were increasing, and by the morning of June 23 the cumulative escapement was estimated at 1,800 sockeye, 21,000 chinook, and 74,000 chum salmon (Table 27). In retrospect, there were more chums than normal for that time of year, but the sockeye run was late and apparently the chum run was not. On the afternoon aerial survey a few sockeye were observed in Wood River, and some jumpers were sighted below Portage Creek. Most fish observed, however, appeared to be schooled chums. Between 100 and 200 sockeye were visible in Igushik Lagoon.

Test boat catches increased on June 24, and a processor at Clark's Point reported seeing fish moving up on the flood and back on the ebb on June 24, indicating that fish were milling in the district. Catches by the test boat fell off on June 25, but subsistence sockeye catches continued to increase at Igushik Beach and in Dillingham. Increasing numbers of sockeye were documented during daily aerial surveys of the three major river systems, but the combined escapements remained low. Test boat catches on June 26 showed a slight increase, and the morning drifts on June 27 were similar (Table 11). Naknek tower counts increased rapidly on June 26 (Table 26). Normally Wood River follows the same pattern 48 hours later.

By June 27, we were sending out a test boat on every tide, flying daily aerial surveys of the three major rivers, and monitoring the daily tower counts, but there was simply nothing happening yet. An experienced processor reported seeing some fish activity along Ekuk beach, but qualified report with "it's just not there yet." In addition, it was evident that the chinook run was not large enough to consider a commercial opening.

A 12-hour subsistence opening was announced to begin at 2:00 p.m., June 27, because the subsistence fishery had been closed since June 20 and a commercial fishery did not appear imminent. Catch information from this opening would give managers a sense of fish volume building in the district, and would allow participants to fill their drying racks before the commercial fishery began in earnest. Fishing success was fair and most people were able to harvest the fish they needed without great difficulty. However, the subsistence harvest on the Dillingham beaches and low sonar counts at Portage Creek confirmed that only a few chinook had escaped into the lower Nushagak River (Table 27).

Fishermen were becoming increasingly concerned as the end of June approached and no commercial fishery had taken place. At 9:00 a.m. on the morning of June 28 we gave an update on VHF radio and summarized the test boat results, tower counts, aerial surveys, etc.. Only 0.5% of the Wood River, 20% of the Igushik River (including an estimate of fish in muddy water), and 2% of the Nushagak River sockeye escapement goals had been achieved. Very few fish were accounted for, for this time in the season.

June 29 brought clear weather in the morning and conditions were good during an aerial survey of Grassy Island and Igushik, Wood, and Nushagak Rivers. There was no sign of fish in the muddy water of Wood River, and little sign in the clear water. Igushik lagoon contained only 140 fish, down from over 1,000 two days before (Table 33). Subsistence catches on the local beaches did well, but the catch was not heavy and varied from 30 to 75 fish per net. Test boat indices were the highest of the season, and all but 4 of the 25 stations fished produced some sockeye. On the evening tide, the second test boat caught fish at 16 of 18 stations fished.

An early morning aerial survey was flown on June 30. Surveyors observed only 200 fish in Wood River and 210 in Igushik. With the increase in test boat catches

on June 29, we expected big numbers on the morning drifts on June 30. The early drifts on the inside stations were actually quite low, but improved farther south at Nushagak Point (Table 11). Later in the day we began to get more encouraging reports, with good subsistence catches reported from Lewis Point, people hitting fish with props along Combine Flats, and a continued good showing in the Naknek Tower escapement. The flight service station reported the area (6A) weather forecast, calling for SE 15 increasing to E 20. That forecast did hold true.

At 6:00 p.m. we updated the fleet and advised all vessels to float on the evening tide. Fishermen were advised to closely monitor their radios for a possible short-notice announcement for fishing as early as 8:00 a.m. the following morning. Test boat indices improved in the upper stations on the late evening tide, perhaps as a result of the wind. At 10:10 p.m. a reliable processor at Clark's Point reported a major showing of fish off of their dock. "There are jumpers in the air at all times, both on shore and off shore, and it appears that the fish are moving upriver very quickly. This is the first major showing of the season."

We were soon deluged with reports of a strong showing of fish from mid-Ekuk Bluff to Lewis Point. Although test boat catches were not as large as we had hoped, reports of jumpers gave evidence that fish were finally moving into the escapement in good numbers, and we could not delay the commercial fishery any longer. At that point we knew we had some escapement, but were unsure of how much. If we waited for the next morning's light to evaluate the escapement with an aerial survey, a huge volume could conceivably pass the fishery. Chinook escapement past Portage Creek then stood at 30,000 fish, roughly 40% of the escapement goal.

In an effort to hold the sockeye harvest to a moderate level until we could better evaluate the escapement, and to maximize protection to an obviously weak chinook run, we elected to fish for a 7-hour period, and restricted gear to small mesh (6.75 in or less) gill nets. Because we had put the fleet on short notice, we were able to broadcast the announcement at 6:00 a.m., July 1, and allow the fishery to open just 2 hours later at 8:00 a.m.. The fishery went quite well, and the sockeye harvest totaled just under 400,000 (Table 18). The best set net catches in the district were along upper Combine Flats, which indicated that a

good number of fish had passed into the escapement. The chinook catch of just over 2,000 (following a complete closure for the entire month of June) confirmed that the chinook run was weak, and that most of the fish had already migrated into the escapement.

An 8:00 a.m. aerial survey on July 1 confirmed that a large number of sockeye had passed into the escapement. Only 2,300 fish were visible in clear water in Wood River, but jumpers were seen in muddy water below, indicating another push into the lower river. The lower Nushagak has improved; over 14,000 fish were estimated in clear water below the sonar site, and fish were observed in muddy water south to the commercial fishery at Nushagak Point. Surveyors estimated 100,000 fish in the Nushagak River between the fishery and the sonar site. Based on sonar counts on July 1 and 2, that estimate was fairly accurate (Table 27).

We estimated that only 10% of the Nushagak District sockeye forecast had been accounted for by the evening of July 1. On the afternoon aerial survey, Wood River escapement was still not impressive, and those observations were confirmed by the low tower counts (Table 26). Escapement in the lower Nushagak River looked good by comparison, and fish were moving past Black Point in a band 6 to 8 wide. Observations on the morning survey on July 2 documented improved escapement into Wood River, with good signs of fish in muddy water below and 21,000 fish visible in clear water. Lower Nushagak looked great; over 43,000 fish were observed in clear water with more sign below.

A district test boat was deployed on the morning of July 2 and good numbers of sockeye were found at all stations fished. The heaviest indices were found at Tule Point near the mouth of Wood River, and from mid-Combine to Grassy Island near the upper east side of the commercial district. With the low percentage of the projected run accounted for, good numbers of fish moving into all three river systems, and large test boat indices in the area above the commercial district confirming more good sockeye escapement past the fishery, the second opening of the season was announced at 3:00 p.m., July 2, to begin at 10:30 p.m. the same night.

The commercial catch was rather disappointing, and only 165,000 mixed fish were landed (Table 18). Fisherman criticized the night opening and said that seven hours did not give them enough time to find fish and stay on them. Heavy fog on

July 3 prohibited an early morning aerial survey, but by afternoon the fog had cleared and all three rivers were surveyed. An estimated 29,000 fish were observed in clear water stretches of the Nushagak River, and only 8,000 fish were estimated in Wood River, all near the top. Igushik River was doing very well, with over 4,700 fish visible, and most were just coming out of muddy water in long bands 5 to 6 wide. That volume is a "good showing" in the Igushik system, and it was clear from the size and location of the schools sighted that several days of good fish remained below in muddy water.

Due to the poor showing of sockeye escapement in Wood River, and the lower than expected catch in the commercial opening, we had no choice but to let the Nushagak Section rest. However, the good volume showing in the Igushik River and the tower escapement through 1800 (37,000 fish) indicated a greater passage rate than necessary to reach the escapement goal. Therefore, a 12-hour opening was announced for Igushik Section only at 8:00 p.m., July 3 for the following day. A total of 79 set nets and approximately 265 drift boats were observed participating in the opening, based on an aerial survey of the district. Set net catches were low, but the drift boats on the north/south boundary near the outer line were doing well. The harvest was estimated at approximately 75,000 fish, and may have been the largest ever reported for a 12-hour opening in the Igushik Section.

Fog prohibited an early morning aerial survey on July 4, but lifted by afternoon. The Igushik Section fishery and all three rivers were surveyed. A test boat was deployed in the early morning hours, and few fish were found in the areas sampled above Pile Driver Creek. The same vessel extended the trip and fished the second tide as well. Fish were found at every location sampled, but the volume was not large (Table 11). Another test boat left the dock just before midnight and fished as far south as Clark's Point with little success. The vessel did not fish the upper stations on the early morning tide due to a mis-communication. Only a few drifts were made the next morning, but the catches were low.

At 1:00 p.m. on July 5 another test boat began sampling in the area above the commercial district. Only fair numbers of fish were found until they reached Grassy Island. Very large sets were made at Grassy Island, Nushagak Point, Queen Slough, and Clark's Point where the drifts were terminated. The test fish indices at those four locations averaged over 22,000 fish, among the largest in

the history of the program. Virtually all of the fish caught in those large sets hit the lower side of the net and were moving upriver against the ebbing tide. When sockeye exhibit that type of migration pattern, the fishery managers are assured that most of them are committed to moving into the escapement, and are unlikely to migrate back into the commercial district.

The office was literally swamped with calls throughout the day from fishermen reporting large numbers of jumpers and a heavy movement of fish in the upper part of the district. Because the hourly escapement counts were very low on both the Wood and Nushagak Rivers, and because the test fish indices were low in the area above the commercial district, we needed a portion of the fish present in the upper district to move into the escapement before allowing a commercial opening. We estimated that the fish between Clark's Point and the inside marker would be past the commercial fishery and secure within the next 12 hours because the fish were so numerous and were moving hard against the ebb. Following that assumption, we announced a 12-hour opening at 8:00 p.m., July 5 to begin at 1:00 a.m., July 6.

About 15 minutes after the announcement, we began to get calls from frantic set net fishermen on Ekuk beach stating that they could not reach their sites and participate in the opening due to a recent rock slide and the height of the early morning tide. For over 20 years we have opened the Nushagak District from 2.5 to 3 hours before book high water, and this opening was scheduled 2 hours and 34 minutes before a 19.1-ft tide.

Processor's at Ekuk had confirmed that the beach had changed, and estimated access to as many as 30-40 set net sites had been jeopardized. So, we rescinded the original announcement and rescheduled the opening for 12:00 midnight. The 1-hour adjustment did not appear to adversely affect any of the other sites in the district, but set net fishermen were advised that this issue would be brought before the Nushagak Fish and Game Advisory Committee during the next winter, so that a potential adjustment to the policy could be publicly debated before the next fishing season.

The early morning aerial survey on July 6 was hampered by low ceilings and fog, but few fish were observed in the upper Wood River and in the Nushagak River just below the sonar site. It was evident that a large number of fish were present

in the muddy water in the lower portion of both rivers. Many jumpers and finners were observed from the Picnic Point area to Lewis Point and Black Point. The leading edge of the fish was apparently just coming out of muddy water at the time of the survey. Under very poor conditions (low ceilings, fog, glare, wind chop, and the wrong stage of the tide) 5,300 fish were visible in the upper Igushik River, and long bands of sockeye were observed in the middle portion of the river. The actual number of fish present could have been more than double the number surveyors documented.

The commercial fishery was obviously very strong. Some fish were visible at every set net site from Etolin Point to Nushagak Point, and many nets were loaded. Approximately 250 drift boats and 270 set nets were observed fishing. The volume appeared to be the largest at the top and bottom of the district, with lower catches in the middle of the district. We estimated a catch of approximately 500,000 fish for this opening and the actual harvest totaled 558,000 (Table 18). We elected to let the fishing period close as scheduled (1:00 p.m., July 6) in the Nushagak Section, and then evaluate the escapement. However, due to the extremely good set net catch in Igushik Section on the morning tide, the volume of fish observed in the river on the aerial survey, and the large sockeye escapement past Igushik tower, fishing was extended in the Igushik Section for an additional 12 hours.

The commercial fishery in the Nushagak Section had just closed at 1:00 p.m., but with the heavy catches in the upper part of the district, and the strong showing of fish in the river, we did not want an excessive delay before we could reopen. We elected to send a test boat out to confirm the suspected strength of the fish in the area just above the commercial district. Only four stations were fished and all produced good indices (Table 11).

By late afternoon, fish documented in muddy water on the morning aerial survey had moved into clear water and could be enumerated. At 6:00 p.m. we estimated 59,000 in the upper Wood River, and 27,000 in the Nushagak River just below the sonar site. Both rivers were viewed under poor survey conditions but escapement appeared to be building, and signs of large numbers of fish were still evident in muddy water below.

At 8:00 p.m., July 6 we announced a 12-hour opening for the entire Nushagak

District, to begin at 12:30 a.m., July 7. The Igushik section was originally scheduled to close at 1:00 a.m., July 7 but this opening extended that fishery as well.

On a 6:00 a.m. aerial survey, July 7, the fishery did not appear very strong, but all of the set nets had some fish. Wood River was partially obscured by fog, and the tide was at the wrong stage for good viewing, but surveyors did observe over 50,000 sockeye, and good signs of fish were noted in muddy water below. Viewing conditions were extremely poor on the lower Nushagak River, but 16,000 fish were observed. In addition, a loaded subsistence net was noted at Lewis Point, and hundreds of Beluga whales were observed feeding on fish near Picnic Point. The Wood River tower count confirmed our aerial observations, and by 10:00 a.m. the daily Wood River escapement totaled over 217,000 sockeye (since midnight). Hourly counts at the sonar counter increased dramatically on the late evening of July 6 and on the morning of July 7. Fish were passing at 7,000 per hour on one bank and 12,000 per hour on the other for several hours.

Clearly, the large volume of fish in the area and the soaring sockeye escapements in all three river systems warranted additional fishing time. Fishing effort also entered into the decision making process. The average number of set nets has remained fairly static in recent years and has varied from 250 to 290 during the peak of the run. The normal drift fleet in Nushagak ranges from 400 to 500 vessels, but on July 7 we estimated less then 250. A large fleet will normally catch nearly all of the fish moving through the district, and, as a result, the escapement will fall to a mere trickle within 24 to 36 hours afterwards. Following the catch of 558,000 fish on July 6, however, the hourly rate of escapement on July 7 was quite high. This indicated that, even with the existing fleet size and the large volume present, fish were still able to move through. During an aerial survey of the Nushagak district, we were surprised at the amount of space between the boats. At times we could fly for more than one mi without passing a single vessel.

We felt that additional fishing time was warranted to balance the catch with the rate of escapement. At 8:00 p.m. on Saturday, July 7, fishing was extended for an additional 25-hour period, and scheduled to close at 2:30 a.m. on Monday, July 9 (Table 13).

The volume of fish that had moved through the district by July 8 was impressive. During 48 hours from July 6-7 the fleet had harvested over 800,000 sockeye, the Wood River tower count totaled 500,000, and the Portage Creek sonar count totaled 350,000. Approximately 1.6 million sockeye passed through the district in that very short interval of time.

By the evening of July 8, the rate of escapement had dropped off considerably, but the escapement goal had been reached at both Portage Creek and Igushik tower. Cumulative escapement at Wood River tower stood at 888,000 or 88% of the goal. On July 8 we can normally expect another 12 to 16 days of fish yet to come, so escapement in Wood River was nearly assured, and an additional 24-hour extension was announced at 8:00 p.m. that evening.

Reduced numbers of sockeye continued to move into the rivers as the run gradually fell off (Tables 26 and 27). At 8:00 p.m. on the evening of July 9, the Wood River escapement stood at 920,000, still less than the goal, but slowly creeping upward. With escapement in both Nushagak and Igushik Rivers over the respective goals, the fishery was extended an additional 50 hours and scheduled to close at 4:30 a.m., July 12. On the evening of July 11, Wood River still had not reached the 1,000,000 fish goal, but it was so close (over 964,000 fish) that fishing time was extended until the end of the emergency order period.

Finally, at just before midnight on July 12, the Wood River escapement goal was reached. Therefore, the 48-hour transfer period was waived, effective at 8:00 a.m. the next morning. The regulation concerning the transfer period is very specific in 5AAC 06.370 (f) and states that "when the point escapement goal for sockeye salmon has been achieved for that district", the transfer period shall be waived. This is a rather controversial issue because of the allocative overtones between fishermen and gear types, but the regulation clarifies when the appropriate action should be taken.

With poor escapements of pink salmon (495,000, goal = 1,000,000), and coho salmon (43,000, goal = 150,000) in the parent years, we felt that the regular 5-day fishing schedule would be excessive. To manage these two important species more carefully, we issued an emergency order on July 22, eliminating the weekly fishing schedule and re-establishing emergency order management of the fishery for the remainder of the season.

A 24-hour opening was allowed on July 23 to give commercial fisherman an additional opportunity to harvest excess sockeye and chum salmon that were still present, as evidenced by good subsistence catches on Dillingham beaches during the weekend closure. The objective of that opening was successful, and over 43,000 salmon were harvested during the fishing period (Table 18), less than one-fourth of which were pink and coho salmon.

A test boat was sent out on July 25 with pink gear (4.5-in mesh) to determine relative pink salmon abundance and distribution above the commercial district. That may have been the first time test fishing with pink gear was ever attempted in Bristol Bay. Some pink salmon were documented in four sets from Snag Point to Coffee Point, and the indices ranged from 400 to 4,400.

With a commercial harvest of less than 30,000 pink salmon (well below the average for that date), and fair numbers of fish documented above the commercial district, we elected to have a 12-hour commercial opening on July 27. The principal purpose of the opening was to test pink run strength while the number of coho in the district was still low. The pink catch for that opening totaled approximately 24,000, considerably less than expected had the run exhibited normal timing. The incidental catch of over 4,000 coho brought the total harvest for that species to 7,400 fish. With cumulative escapements through July 27 of just over 4,000 pink salmon and less than 2,000 coho salmon, we had no alternative but to delay any further commercial fishery until the numbers improved considerably. The escapement totals for both species did improve dramatically over time (Table 27), but only after a long closure of the commercial fishery. With the likelihood that the escapement goals would not be reached for pink or coho salmon, and, therefore, no further commercial openings would occur, the subsistence fishery in the commercial district was reopened on August 8 until further notice.

Togiak District

The 1990 total run forecast for the Togiak River totaled 323,000 sockeye salmon, of which 65% were projected to be 3-ocean fish and 35% 2-ocean fish (Tables 2 and 3). With an escapement goal of 150,000 at Togiak Lake, 173,000 sockeye were potentially available as harvestable surplus in the Togiak River Section. Smaller sockeye runs to other drainages in the district (primarily Kulukak

Section) do occur, but these are not included in the forecast because age composition and escapement data are not complete.

Togiak District is managed differently than other areas of Bristol Bay, using a fixed fishing schedule of three days per week in the Kulukak Section, four days per week in Togiak Section, and five days per week in the Osviak, Matogak, and Cape Pierce Sections, although the schedule may be adjusted by emergency order as necessary to achieve desired escapement.

Because the projected sockeye harvest was only slightly more than the escapement goal, a conservative management approach was necessary from the beginning of the season. The department did not generate a formal chinook salmon forecast this season, although a declining trend in chinook runs observed over the last several years was another management concern.

The first landings of the 1990 season occurred on June 11 (Table 20) and only small numbers of sockeye and chinook were harvested throughout the first week. By the close of fishing the following week, the cumulative chinook catch (3,640 fish) was on par with the historical average catch for that date, and the sockeye catch was slightly above the historical average catch for that date.

Although chinook catches were average for this time, declining runs throughout the past five years warranted a more cautious management approach to achieve the desired chinook escapement. A mesh size restriction was made effective by emergency order Monday, June 25, 9:00 a.m. to reduce the chinook harvest (Table 13). At the same time, the weekly schedule was reduced to three days, 9:00 a.m. Monday to 9:00 a.m. Thursday, in all sections of the District to further protect the chinook run and to bring the sockeye harvest rate in line with the forecast.

The first significant sockeye catch occurred on June 25 when 2,700 fish were landed in the Togiak Section and 2,400 fish were landed in the Matogak Section (Tables 21 and 23). Daily catches in the Kulukak Section at this time also increased but not to the same extent (Table 22). By the end of the June 25 fishing period, the cumulative sockeye catch in Togiak Section totalled 15,300 fish, which was average for this time period. The cumulative sockeye catch in Kulukak Section (8,100 fish) was slightly above the long-term average, as was the

sockeye catch in the Matogak Section.

The first aerial survey of the Kulukak and Togiak Rivers was flown June 30 under excellent conditions to determine the sockeye escapement rates (Table 34). Sockeye and chum were observed in both systems in very low numbers, and no fish were sighted in Tithe Creek Ponds or the Kanik River.

Sockeye catches in Togiak Section were strong the week of July 2, climbing above the forecasted catch curve on July 3. This increase indicated that a significant volume of sockeye had moved into the Section, especially since the fleet numbered only 38 vessels for the entire District (Table 14). Sockeye catch in Kulukak Section had also increased significantly, surpassing the long-term average by the end of the week by approximately 50%.

Escapement past the counting tower stood at 3,300 sockeye as fishing in the District closed for the week on July 5 (Table 26). This was low for this time, but held no cause for immediate concern since significant numbers of fish do not show at the tower, historically, until the second week of July. An aerial survey was conducted July 7 on the Togiak and Kulukak Rivers (Table 34). Visibility and water clarity was good, and the water level in both rivers was notably low. Results of the survey were fair, with 1,700 mixed chum and sockeye enumerated in Kulukak River, and 5,000 sockeye and 3,900 chum observed in Togiak River. Of the sockeye observed in the Togiak River, all but 150 were found below the Ongivinuck River, still a few days away from passing the counting tower.

District sockeye catches during the week of July 9 were good. The first day 16,500 sockeye were delivered, and 81,800 sockeye were delivered throughout the week (Table 20). This was the highest weekly catch of the season, and indicated the presence of a strong volume of fish in the commercial district. Sockeye catches in both Togiak and Kulukak Sections had again climbed above the forecast based on historic catch averages for that week.

An aerial survey conducted on July 10 provided more encouraging results (Table 34). 3,300 sockeye and 1,400 chum were enumerated in Kulukak River below Kulukak Lake. Distribution was even in Togiak River, where a total of 23,500 sockeye were enumerated. Visibility and viewing conditions were excellent, and water levels were very low. Although tower counts were behind the historical average,

the number of sockeye sighted during the survey was promising. Another survey was conducted on both the Togiak and Kulukak Rivers on July 12 (Table 34). Visibility, although still good, had decreased slightly since the previous survey. In the Kulukak River, 4,300 and 1,400 sockeye were observed in the river and lake, respectively. 9,200 sockeye were observed in the Togiak River, with roughly 5,200 sockeye enumerated between the Gechiak and Ongivinuck River. Escapement past the tower on July 12 stood at 19,146 sockeye, now well below the long-term average for this date.

Although the tower counts were lagging behind the historic curve, an estimate of 40,000 sockeye inriver was obtained by applying an expansion factor of 3.0 to the survey results from July 10 and July 12. Adding the inriver estimate to the July 12 escapement past the counting tower, a total of over 59,100 sockeye were estimated in freshwater. At that time sockeye were passing the tower at a rate slightly less than 5,000 fish per day (Table 26). The increased catches in the District and a general increase in fish observed in the Togiak and Kulukak Rivers gave evidence that the run may be as strong as forecasted, but may be running several days later than normal.

It was becoming apparent that run timing was late in Togiak and other districts, and run sizes around the rest of Bristol Bay were appearing to be greater than forecast. Therefore, it was decided to use the commercial fleet to evaluate fish strength during the weekend. Fishing was permitted in the entire Togiak District for a 24-hour period beginning 9:00 p.m. Friday, July 13 (Table 13). This period resulted in the highest daily catch of the season, with roughly 30,600 sockeye harvested in Togiak and Kulukak Sections combined (Matogak and Osviak had no fishing effort)(Tables 21-24). The cumulative sockeye catch for Togiak District through July 14 stood at 191,200 fish, nearly 18,000 fish greater than the forecasted harvest.

Escapement slowed at the tower on July 14, and on July 15 only 1,400 fish passed (Table 26). Another survey was flown on July 15 to reassess the inriver abundance (Table 34). Results were similar to the previous survey on July 12. 10,000 sockeye were estimated in the Togiak River, most below the Ongivinuck River. Conditions were excellent and the water level was extremely low.

It was becoming apparent at this point that clear water and extremely low water

caught in Togiak Section (Table 20), and as of August 3 the cumulative District catch stood at 229,100 sockeye.

Daily escapement rates at the tower increased again to 5,000 sockeye on August 2 and 3 (Table 26). The cumulative escapement through August 6 stood at 131,600 fish, or 88% of the escapement goal, and the daily escapement rate then averaged 3,000 fish. Historically at this time the sockeye run is 99% complete, and with fish still passing the tower in good numbers, it appeared the actual escapement may come close to the goal. With the sockeye run virtually over, the fishery was allowed to re-open in the entire District beginning 9:00 a.m., August 7 for a 3-day period (Table 13).

The preliminary district sockeye catch totalled 237,499 fish (Table 20), 69% of the 20-year average (Appendix Tables 5 and 20). Escapement enumeration at Togiak Lake was discontinued on August 9. A post-season adjustment was applied to the final tower count of 138,144 sockeye to compensate for late run timing and passage rates of 2,000 fish per day still occurring when the tower project was pulled. Togiak Lake escapement was estimated at 141,977 sockeye, or 95% of the escapement goal (Table 26). Combining the final escapement with the escapement estimate for the tributaries and main river stem of 47,145 sockeye (Appendix Table 20) resulted in a Togiak Drainage escapement of 189,122 sockeye. The escapement plus the Togiak Section catch yielded a total run to Togiak Section of 373,407 sockeye, which was 16% greater than the preseason forecast. Escapement into the Kulukak Section totaled 49,600, 22% above the recent 10-year average of 41,000 fish (ADF&G 1990, *in press*). Combining the escapement and catch in Kulukak Section resulted in a total run of 91,218 sockeye to that system. Total runs to Osviak and Matogak combined totalled 16,716 sockeye.

The 1990 Togiak District catch of 12,241 chinook was approximately 50% of the recent year average (1980-89) due in part to reduced fishing time throughout the district (Appendix Table 6). Post-season aerial escapement estimates of chinook on the spawning grounds were still below average causing increased concern for the health of these stocks (ADF&G 1990, *in press*). Escapement estimates totalled 6,473 for Togiak River and 953 for Kulukak River. An additional 1,681 were estimated in the Quigmy, Osviak, Matogak, Negukthlik, and Ungalikthluk Rivers. The total district escapement of 9,107 chinook was among the lowest on record for the fifth consecutive year, and the 1990 total run of 21,348 chinook salmon was

the lowest in the past twenty years (Appendix Table 31).

The Togiak District chum harvest of 115,711 was the lowest since 1975, and the third lowest on record (Appendix Table 7). The commercial catch combined with the district-wide aerial escapement estimate of 67,000 fish (ADF&G 1990, *in press*) produced a total run of just 182,711 chum. This was about 38% of the 20-year mean, and the lowest total run recorded for the Togiak District (Appendix Table 32).

Although generally not targeted in Togiak District, pink salmon are caught incidental to sockeye and coho fisheries. The 1990 pink catch in Togiak District totalled only 9,014 fish (Table 20), largely due to reduced fishing time. Pink escapement in 1990 totaled 223,800 fish based on aerial surveys conducted by the USF&WS (USF&WS, unpublished data). The pink catch and escapement combined produced a total run of 232,814 fish.

Due to the increased interest in coho salmon and the growing commercial fishing effort in recent years, management of this species has become increasingly difficult with the limited data available. The 1990 coho run to the Togiak District was not expected to be strong. The parent year run (1986) was poor, with a district catch of 48,000 fish and an estimated district escapement of 30,000 fish (Appendix Table 36).

Poor production in recent years coupled with the poor parent year escapement warranted a cautious approach at the beginning of the season. As of August 10, the cumulative coho catch (754 fish) was below average (Table 20). However, it was too early in the run to draw any conclusions. The strength of the coho run was still uncertain and it was decided to use the fleet to help determine run size. Fishing was permitted in Togiak District for a 48-hour period beginning 9:00 a.m., August 13 (Table 13).

A total of 2,000 coho were caught in Togiak District during the 48-hour period. The average district catch (1984-1989) on August 14 and 15 is 1,475 and 2,120 coho, respectively. Thus, daily catches of coho during this period were less than the historical average. Historically the coho catch reaches 25% of the season total by August 15. It was now evident that the coho run to Togiak this year was indeed weak, and, effective 9:00 a.m., August 20, the Togiak District

was closed to commercial fishing for the season (Table 13). The season's cumulative coho harvest for the entire Togiak District totalled 2,719 fish (Table 20). Of this total, 2,296 coho were taken in the Togiak Section (Table 21).

Poor weather during most of August prevented aerial surveys to estimate coho escapement. The first aerial survey was conducted on August 31 under generally poor conditions, with turbid water and high water levels. Only 200 coho were observed in Togiak River; 600 coho were observed in Kulukak River. Another survey was flown on September 7, under improved conditions. A total of 7,100 coho were observed in the Togiak River, including the Gechiak River and the lower Ongivinuck River. Applying a liberal expansion factor of 3.0 resulted in an estimated inriver abundance of 21,400 fish, or 43% of the escapement goal of 50,000 fish. 4,400 coho were observed in Kulukak River during the same survey. However, water conditions and visibility in Kulukak River were good. A factor of 1.5 was applied to the aerial count, resulting in an inriver abundance estimate of 6,700 coho.

Aerial surveys of coho salmon on the spawning grounds were conducted in the Togiak District on October 1 and 2 (ADF&G 1990, *in press*). Coho escapement in the Togiak River and its tributaries totalled 21,400 fish, or 43% of the escapement goal of 50,000 fish. Escapement in Kulukak River totalled 15,600 coho, slightly above the escapement goal of 15,000 fish. Ungalikthluk contained 12,500 coho, and Quigmy, Osviak, Matogak, and Slug Rivers together contained another 18,000 coho. Coho escapement for the entire Togiak District totalled 67,450 fish. Comparative counts from previous years are provided in Appendix Table 36.

1990 SUBSISTENCE SALMON FISHERY

Archaeological evidence in Bristol Bay indicates that indigenous residents have utilized salmon as a food source since prehistoric times. Salmon continues to be a significant subsistence resource in all Bristol Bay communities. All five species of Bristol Bay salmon are utilized for subsistence purposes, but the most popular are sockeye, chinook, and coho. Many residents continue to preserve large quantities of fish through traditional methods such as drying and smoking.

Fish are also frozen, canned, salted, pickled, fermented, and eaten fresh. In some communities, significant numbers of fish are put up for dog teams as well.

Regulations

In 1989, a significant legal decision (McDowell v. State) affected the way the state's subsistence law was implemented. The court upheld subsistence as a priority over other uses, but disallowed a rural subsistence priority. Consequently, as of July 1, 1990, the personal use fishery was eliminated and all Alaskan residents became eligible to fish for subsistence in any Bristol Bay drainage. Previously, only persons domiciled in the Naknek, Nushagak, Togiak, and Iliamna-Lake Clark watersheds could obtain subsistence permits for those drainages. Fish for home use could be harvested by non-watershed Alaska residents in the Nushagak or Naknek drainages under personal use regulations. In the Egegik and Ugashik drainages, all state residents continued to be eligible to participate.

On the east side of Bristol Bay subsistence fishing was allowed seven days per week prior to and after the emergency order period (9:00 a.m., June 23 until 9:00 a.m., July 17). During the emergency order period within the commercial districts, subsistence fishing was allowed with legal gear during open commercial fishing periods, and in the Egegik, Ugashik, and Naknek Rivers twice a week: from 9:00 a.m., Tuesday to 9:00 a.m., Wednesday, and from 9:00 a.m., Saturday until 9:00 a.m., Sunday. In the Kvichak River subsistence fishing was permitted seven days per week. Gear was limited to 10 fathoms of gill net inside the Naknek/Kvichak, Egegik, and Ugashik Rivers and 25 fathoms in the remaining waters. In all areas set gill nets were to be at least 300 feet apart.

In the Nushagak District, subsistence fishing was permitted by emergency order in the commercial district and during open commercial fishing periods. During emergency order subsistence periods, gear was limited to 10 fathoms, and, as was true during the commercial openings, nets had to be at least 450 feet apart. From Red Bluff to Bradford Point (the "Dillingham Beaches") nets were limited to 10 fathoms, 100 feet apart. Elsewhere in the Nushagak Management Area nets were limited to 25 fathoms, 300 feet apart.

In-season Subsistence Management

Subsistence fishing was allowed by emergency order in the Nushagak commercial district for the third consecutive year in a row. In recent years, declining chinook and coho stocks resulted in longer commercial closures and some residents had an increasingly difficult time obtaining fish for home use. In 1990, three openings were permitted by emergency order:

1. 9:00 a.m., May 28 until 9:00 a.m., June 20;
2. A 12-hr period from 2:00 p.m., June 27 until 2:00 a.m., June 28;
3. 12:00 noon, August 8 until 12:00 midnight, September 30.

This was the most subsistence opportunity provided in the commercial district since statehood. The extended opening in May and June allowed residents to put up fish prior to the first commercial fishing period. The extended opening in August and September afforded residents the chance to harvest coho salmon.

Permit System

To document the harvest of salmon for subsistence, a permit system was gradually introduced throughout the region in the late 1960's and early 1970's. Much of the growth in the number of permits issued during these years reflects increasing compliance with the permitting and reporting requirements and the level of effort expended each year by the Department in making permits available, contacting individuals, and reminding them to return the harvest forms. Subsequent increases reflect a growing regional population. With the exception of residents of a few communities, most fishermen are obtaining permits and reporting their catches. However, fish removed from commercial catches for immediate consumption or future personal use are probably not included in most reported subsistence harvest totals. Also, fish caught later in the season, such as coho and spawning salmon, are probably not documented as carefully as the main supply of chinook and sockeye salmon.

Numbers of permits issued in the 1980's have annually ranged from a high of 1,243 in 1980 to a low of 806 in 1982. The most recent 10-year average is 954 permits issued, 154 more than the past 20-year average. Population growth accounts for the generally higher numbers of permits issued in the Bristol Bay area during the

1980's. In 1990, a total of 1,042 permits were issued (Table 40) for Bristol Bay. Both Ugashik and Egegik issued more permits in 1990 than in previous years. The Togiak District fluctuates, with higher numbers of permits every other year. The Nushagak and Naknek/Kvichak Districts have the largest numbers of subsistence permits issued in Bristol Bay, and those issued this year are within the general range of the last 10 years, though each was slightly higher than its most recent 10-year average.

Subsistence Salmon Harvest Levels

The Bristol Bay subsistence salmon harvest in 1990 totaled 168,161 fish (Table 40). This number is slightly higher than the 20-year average but close to the more recent 10-year average of 172,136 fish (Appendix Table 46). Harvests in Egegik and Ugashik have been generally higher during the last 4-5 years than previously while harvests in the Nushagak District have somewhat declined during that period. The Togiak and Naknek/Kvichak harvests were within historical ranges. The subsistence salmon harvest was composed of 78.4% sockeye, 8.3% chinook, 5.8% chum, 4.9% coho, and 2.6% pink. The combined salmon harvest represents 0.003% of the total 1990 salmon run.

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BRISTOL BAY

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1990 TOGIAK DISTRICT HERRING FISHERY

Introduction

Pacific herring (*Clupea harangus pallasi*) have been reported throughout Bristol Bay, but the major concentration returns to the Togiak area each spring as the focus of two commercial fisheries (Figure 1). The herring sac roe fishery began in Bristol Bay in 1967 and was followed by a fishery for spawn on rockweed kelp (*Fucus spp.*) in 1968. For the first 10 years of the fishery, effort levels and the number of processors remained small, and in 1971 and 1976, the herring sac roe fishery did not operate due to poor market conditions. However, favorable market conditions and additional incentives provided by the Fishery Conservation and Management Act of 1976 (the 200-mi limit) resulted in a major expansion of the Togiak herring fishery in 1977.

Commercial sac roe and spawn-on-kelp fishing in the Togiak District has been regulated by emergency order since 1981 to achieve exploitation mandates by the Board of Fisheries and address problems with wastage. In 1984 the Bristol Bay Herring Management Plan (5 AAC 27.865) was adopted by the Board. The regulatory management plan and other directives from the board set the policies by which these fisheries are prosecuted. The current management plan was modified at a recent meeting of the Alaska Board of Fisheries, and is included as Appendix 1 in this report.

The Bristol Bay Herring Management Plan specifically states that the maximum exploitation of the Bristol Bay herring stock is 20%. Before opening the sac roe fishery, 1,500 short tons must be set aside for the spawn-on-kelp fishery, and 7% of the remaining available harvest is allocated to the Dutch Harbor food and bait fishery. After the spawn-on-kelp and the Dutch Harbor food and bait harvests have been subtracted, the remaining harvestable surplus is allocated to the sac roe fishery: 25% to the gill net fleet, and 75% to the purse seine fleet.

Action by the Alaska Board of Fisheries at their most recent (October 1989) meeting reduced the legal of purse seine size to 100 fathoms in length and 16 fathoms in depth. Gill nets were also reduced to a maximum of 100 fathoms in

length per permit holder with only one compliment of gear allowed to operate from a single vessel. The Department was also given emergency order authority to further reduce the length of gill net fished by a single vessel to 50 fathoms, if it was deemed necessary. The line that previously divided the gill net and seine fisheries was eliminated, but the Board declared that the gill net fleet must fish first on the first opening of the season. There was no change in the existing allocation between the two gear types, and the herring spawn-on-kelp harvest methods remained the same.

1990 was the first season that limited entry was in effect for the Togiak spawn-on-kelp fishery. Prior to 1990, people were told that they must have a permit to participate in the harvest, since their hands were considered harvest gear. Any person that applied for a permit and paid the appropriate fee was issued one. In 1990 an interim-use permit was required: only participants who possessed a permit and could document participation in one of the three years from 1986-1988 were eligible to apply. A question arose prior to the season over what legal restrictions applied to crew members. This question is yet unresolved and is scheduled to be addressed at the upcoming board meeting in 1992.

A 2- or 3-year rotation of the harvest areas is incorporated in the spawn-on-kelp harvest to protect the plant community.

1990 In-season Herring/Kelp Management

Spring weather conditions were fairly typical in 1990 and on April 2, ice maps of the Bering Sea were indicating an average pack size for that time of year. By April 16, local pilots reported that ice was no longer visible in the area between Dillingham and Togiak. On April 17, NOAA sea surface maps were showing Bristol Bay east of Togiak Bay to be free of ice. The first aerial survey of the season was conducted on April 22 (Table 1). No herring were sighted, but numerous birds and several marine mammals were observed. The second aerial survey was flown on April 25 and again no fish were sighted but several sea lions were noted near the tip of Right Hand Point. Viewing conditions were excellent, and by that time several of the local pilots had joined the Department staff in the search for fish.

On the April 28 survey, one tiny school of fish was observed at the head of Togiak Bay, but the spotters felt they were probably smelt. At the same time, Togiak villagers were reportedly catching smelt for subsistence. Due to heavy river ice in front of the docks in Dillingham, deployment to the grounds was delayed for several days.

Two of the three field camps were finally deployed on April 29 and at that time there were five purse seiners and 8-10 tenders on the grounds. On the afternoon of April 30 the water temperature in the surf line had reached 5-6°C at Metervik Bay and 5°C at Summit Island as well. Approximately 200 tons of fish were sighted on the aerial survey, but no samples were obtained.

Aerial surveys the first four days of May resulted in sightings of several hundred tons of fish each day. These schools were thought to be smelt, and on May 2, an estimated 1151 tons were observed, mostly in small schools, from Ungalikthluk to Matogak section. Later on May 5, 1,590 tons of smelt were estimated in the same area.

The first three herring of the season were caught by a gill net test boat in Kulukak Bay on May 1 and the first company was officially registered on the grounds. By the evening of May 3 only one more herring had been caught but a total of 7 companies had registered with the Department. The first sizable sample of herring was collected from a small school in Kulukak Bay on May 4, and nine female herring of 18 examined were ripe. The other females were reportedly close to maturity. Water temperatures at that time ranged from 3-5°C and the staff was concerned that when a large amount of herring arrived on the grounds they may be very close to spawning.

A total of nine test boats were deployed throughout the district on the morning of May 5, and three of the five purse seiners set on schools of fish. Everyone, spotters, fishermen, and the staff were quite surprised when they caught smelt instead of herring. The four gill net test boats caught no fish after attempting multiple sets in several locations. Test boats on May 6 were unable to fish in the morning due to low ceilings, fog, and ESE winds at 20-30 knots. Samples were obtained from two gill net boats in the afternoon, and tested to be 7 to 13% mature, however, all of the bags tested contained some immature herring. At the 6:30 p.m. report to the fleet, sample results were still being received from the

roe technicians, so we asked the fleet to standby at 9:00 p.m. for an additional announcement. The quality of the late samples were fairly good so we broadcast a brief summary of the possible schedule for the following day, on Channel 7, Marine VHF radio. We recommended that all vessels float on the next morning's tide, and stated that (depending upon the test results) we could fish as early as mid-day on May 7. In the late evening we calibrated the "official time clock" with the WWV Greenwich station (5000 KHz) on the sideband radio.

A total of 14 test boats were given designated areas to fish along the coastline on the morning of May 7. The morning brought low ceilings and fog with a light breeze. The first radio schedule with the fleet was at 10:00 a.m., and the 2nd at 11:00 a.m. because the roe testing was still in progress. The last samples tested were "still a bit green", so we elected to delay opening and send additional test boats out in the afternoon. At 5:00 p.m. we announced that the gill net fleet was on 1-hr notice. However, by 6:30 p.m. we had received enough sample results from the test boats to determine that there were still enough immature fish present to necessitate a further delay. Therefore, we advised the gill net fleet to "stand down" for the evening.

In the early evening we began to get spotter reports of "good quantities of herring" showing in the western part of the district, and department observers estimated 42,000 tons of herring on the grounds (Table 1). A heavy volume of fish was sighted on the east and south sides of Hagemeister Island, and one school of herring spotted near Estes Point was estimated close to 20,000 st. Many schools were visible in the western portion of the district, but few were showing east of Ungalikthluk Bay. Purse seine samples from the western sections ranged from 3 to 9% mature, but many were reported as "quite close to maturity". Since the minimum threshold of 35,000 tons had been observed, a fishery was now justified under the terms of the Bering Sea Herring Management Plan.

At that point, we were estimating approximately 100 seiners and 200 gill net vessels on the grounds, with 15 companies registered to buy fish. The processor capacity at the time was estimated at approximately 13,000 st. Clearly the majority of the fish were not completely ripe, so we scheduled a major test fish effort including 10 gill net vessels and 22 purse seiners to depart at first light on the morning of May 8.

Due to the volume of fish in the area and the intense activity with test boats, aerial surveys, and radio traffic, we suspended all practice sets as of 4:00 p.m. and only allowed seine vessels to restack their gear in preparation for the fishery. Five vessels in several areas conducted search patterns with sonar but were unable to locate any concentrations of herring in fishable areas.

The early morning of May 8 brought fishable weather with a 2,000-ft solid overcast ceiling and SE winds of 5-10 knots. We noted in the log that the official time clock was accurate to the second with the WWV broadcast on the single side-band (SSB) radio. Officially noting the time and date of the calibration of this clock aids in the later prosecution of violations.

Test boat results in the early morning were mixed, with some good and some poor roe recoveries in the samples tested. Only a small amount of herring was present in the Kulukak Bay area where many gill net vessels were anchored. At 9:00 a.m. we broadcast to the fleet (on VHF Channel 7 and .2509 KHz SSB) that the next update would be at 12:00 noon. Length frequencies from the first 329 herring sampled indicated over 60% of the sample was comprised of age 9+ herring, similar to the preseason forecast.

At noon we still had no firm information from the test boats, but some herring had been collected and sent to roe technicians for testing. Because of the Board's requirement for the gill net fleet to fish first, the gill-netters were advised to stay tuned for results from the roe tests and a possible announcement, based on the recoveries. By early afternoon, herring were moving to the beach in good numbers and roe recoveries had improved in many areas, particularly along the beach from Anchor Point to Rocky Point. A small amount of spawning took place on May 7 and by the afternoon of May 8, new spawns were appearing in many areas (Table 1).

Samples collected north of Anchor Point and from the western portion of the district were still not of marketable quality. Due to the increase in the amount of observed spawn, the volume of herring moving to the beach, and the improved roe recoveries in the gill net samples in the eastern portion of the district, we felt that any further delay could result in reduced roe recoveries in the eastern sections where the gill net fishery was likely to occur. At 3:30 p.m. on May 8 we announced a 4-hr gill net opening from 4:30 p.m. until 8:30 p.m. in

the area from the western most tip of Anchor Point, south and east to Kulukak Point (Table 2).

On an aerial survey during the gill net fishery we observed 277 vessels actively participating, with the majority of the effort in the Rocky Point area where the best samples had been obtained just prior to the opening. With approximately 200 vessels operating in the relatively small area, we were concerned about gear conflicts, but none were reported. Approximately 1,100 tons of herring were landed with a roe recovery of 8.7% (Table 3). The fishery was very clean; only a few vessels still had gear in the water at the time of the closure, and almost no nets were abandoned.

Throughout May 8 new sightings of herring were reported by commercial spotters, with the heaviest volume showing north of Hagemeister Island. By evening Department surveyors had documented more herring on grounds than the preseason projection of 56,000 tons and the biomass appeared to be building (Table 1). During a survey conducted the evening of May 8, the herring biomass was estimated to be approximately 72,000 st. A large number of purse seine test boats were designated to test fish on the morning of May 9 and were requested to start as early as possible. However, the morning brought low ceilings, rain, and fog so only a limited number of areas were sampled.

The first aircraft that were able to fly reported that major spawning had occurred during the night and that there was some visual evidence of concentrations of spawned out herring beginning to build. Our earlier fears were confirmed, and only two days after the first major showing of herring on the grounds, we were at the peak of spawning. It was evident that, due to the extremely warm water conditions, the fish had matured enroute to the spawning grounds. The samples obtained from the seven purse seine vessels that were able to fish were mixed, and contained mature, immature, and many spawned out herring. With the marginal weather and the abrupt deterioration in the quality of the herring sampled, we had no alternative but to fish with the seine fleet as quickly as possible. Due to our concern for aircraft safety (because of the low ceilings and reduced visibility) and a desire to obtain the best possible roe recovery, we elected to allow a long window of fishing opportunity so the fleet could be more selective. At 10:00 a.m. we announced a 3-hr opening for the purse seine fleet from 12:00 noon until 3:00 p.m. (Table 2). The staff felt this would

"take the pressure off" of the spotter pilots, and allow the fishing boats time to search for the best quality herring available.

The best fishing occurred in the bight west of Tongue Point, and near the northeast tip of Hagemeister Island, but some herring were pumped in all sections of the Togiak District (Table 3). The roe recovery was a respectable 9.7%, and the final purse seine harvest totaled 9,200 st, slightly over the purse seine allocation of 9,000 st. During the fishery, an aerial survey of the district was performed to document initial success and to estimate the number of vessels that were participating. A total of 221 purse seiners were observed, the third largest seine effort ever documented in the Togiak fishery (Appendix Table 2). After our initial concern that the harvest would be of low quality due to a high incidence of spawn-outs, we considered the outcome of the seine fishery a huge success.

During the aerial surveys on May 9, a total of 63 spawn sightings and 37.1 mi of milt were recorded, the largest amount ever documented in a single day (Table 1).

With the entire seine allocation already harvested, approximately one-third of the gill net catch landed, and huge numbers of unsalable spawned out herring in the district, the challenge to the fishery managers was clearly defined. After the seine fishery closed, we immediately began to sample with gill net vessels and were surprised to find a significant number of immature fish mixed with mature and spawned out herring. The roe recoveries of those samples ranged from 8% to 11%, with most in the 3%-7% range. Clearly most of the fish were not salable. The fleet was advised of the situation and additional gill net test boats were scheduled to fish on May 10.

A considerable effort was expended test fishing with gill nets in many areas of the district and the results were very disappointing. Perhaps one set in 10 tested would have been salable, and literally all of them contained some amount of spawned out herring. Additional gill net test boats were scheduled to fish on May 11 in designated areas along the coastline.

With an interval of fair weather and almost 50 mi of documented spawn on the grounds, we felt is was advisable to consider a spawn-on-kelp harvest as soon as possible before the product quality could be reduced by siltation in the event

of a storm. Samples of herring spawn-on-kelp were collected at low tide on the evening of May 10 and a meeting with the kelp pickers and buyers was scheduled for 9:00 a.m. on the morning of May 11. Kelpers and all kelp companies were advised to stand by at 10:00 a.m. on May 11 for a possible opening on that evenings' low tide, depending upon the quality of the samples.

The early gill net samples obtained on the morning of May 11 were slightly improved over the previous day, with fewer spawned out herring present. However, most samples still contained some immature fish, which tended to reduce the overall quality. Additional vessels were sent out to retest several areas that appeared to be promising.

Kelp samples from area K-8 proved to be the best examined, and most of the product from that area appeared to be of salable quality. The weather forecast was calling for SE winds increasing to 25 knots in the afternoon. The staff was concerned that a wind of that velocity might stir up the silt from the bottom and contaminate the kelp, thus rendering the product unsalable. Due to this concern for product quality and the awareness that Area K-8 would be somewhat protected from a SE wind, we announced at 10:00 a.m. for a 3-hr spawn-on-kelp opening starting at 8:30 p.m. May 11 (Table 2). We expected the kelping effort to be large, based on the number of interim use permits that had been issued, but some of the product was of marginal quality and we felt that a 3-hr opening would allow the harvesters time to be more selective in what they picked.

Gill net samples obtained later on May 11 continued to show mixed results, but three locations were identified to contain herring of salable quality. At 3:00 p.m. the second, 4-hr gill net opening of the season was announced for 4:00 p.m. (Table 2).

That opening produced a disappointing harvest of 382 st, and due to low roe recoveries, over 50 tons were classified as bait quality. The season's gill net harvest through the morning of May 12 totaled roughly one-half of the 3,000-ton allocation. Because of the relatively poor fishing success by the gill net fleet, many vessels departed the grounds for Security Cove in the hope of participating there. Historically, the spawn-on-kelp harvest has taken place after the commercial fishery, and when kelping was over, many fishermen decided to leave the grounds.

With a rapidly dwindling gill net fleet, it was becoming increasingly difficult to get volunteers to test fish. Much of the herring had moved away from the beach after spawning and with the reduced volume near shore, it was difficult for the test boats to acquire samples. However, when some vessels began to get better recoveries on the morning of May 12, additional boats began to volunteer again. Samples taken in the eastern end of the district tested to be of higher quality, so sampling efforts were concentrated there. By late evening on May 12, the herring collected on both sides of Right Hand Point were approaching maturity, and contained few spawn-outs. Unfortunately, by the time the quality could be verified, the tide was falling rapidly and it was too late to consider a fishery that evening. The general movement of herring was from west to east and we anticipated that by morning salable fish would be available on the east side of Right Hand Point. Therefore, a 3-hr opening was scheduled to begin at 5:30 a.m. on May 13 in that area (Table 2).

Good herring, but low volume was the report on May 13 and the harvest for the 3-hr opening totaled only 89 st. After three gill net fishing periods the cumulative harvest for that gear type was approximately 1,600 st. Following the extremely low success on the early morning opening, even more vessels took advantage of the good weather and left the grounds.

May 14 brought surveyable weather, but due to constant winds over the past several days, the turbidity level did not allow for a comprehensive survey of the entire district. Test fishing on May 14 was limited to just a few areas because only a limited number of vessels were willing to volunteer. A quantity of good herring were located in the area from Rocky Point to Anchor Point, and along the east side of Right Hand Point. A retest of those two areas later in the day confirmed the presence of salable herring, so the fourth gill net opening of the 1990 season was announced to begin at 6:00 p.m. May 14 (Table 2).

With almost 1,400 tons left to harvest, a much reduced gill net fleet, and a lower volume of herring in the near shore areas, it was evident that the entire quota would not be taken in the fishing time allotted for this opening. During a normal gill net fishery at Togiak, the catching power of the fleet is much larger, and frequent closures are necessary to maintain the desired rate of exploitation. However, in this instance we desired to continue the harvest as long as the herring caught were marketable. To confirm the quality of the fish

being landed, we polled the remaining processors by radio, sent skiffs out to the tenders receiving fish, and also gathered samples from the fishing boats.

We discovered a new technique at this point that proved invaluable in this opening and several later ones. Obtaining a quick representative sample from the catch when the fishery is in progress, has been a problem in the past. To accomplish this we had to identify the area in which the largest volume of herring was being caught, collect several unbiased samples, get them to the roe technicians for testing, and still allow time prior to the closure to announce a possible extension in fishing time. When the May 14 opening was first announced, we advised the fleet of this intent, and then stated a time when they should anticipate our next broadcast.

We employed the helicopter to great advantage (collecting the samples mentioned above). The utility of the helicopter allowed us to quickly assess the fishery and direct Department skiffs to specific areas to procure samples. In addition we utilized a brailer bag attached to the helicopter via a 50-ft longline to collect samples from specific fishing boats in areas of herring concentration. By collecting samples directly from the decks of fishing boats and Department skiffs, we were able to deliver them to the processing vessels, where the samples were tested and the results were transmitted to the Department in a short amount of time. To reduce potential bias on the part of the samplers, we made an effort to distribute individual bags from each test boat to technicians from different companies.

The samples collected mid-period were quite good, and no vessels were being turned away as they attempted to deliver, so we announced a 10-hr extension to close at 8:00 a.m. on May 15 (Table 2). After fishing all night, we felt that a closure was necessary to verify both the quality and the quantity that had been harvested. We estimated that 111 vessels participated, so the fleet had declined by 60% from the first opening. By the evening of May 15, the gill net harvest was estimated at approximately 2,350 st, therefore about 650 tons remained to be harvested.

Additional test boats were deployed in several areas on May 16, but their catches were extremely low. Several of the vessels had water hauls on three or four attempts, and others caught so few herring that there were not enough to comprise

a sample. May 17 brought bad weather with high winds, rain and fog. Area 6A had a storm warning forecast for the evening and forecasters were calling for SE winds to 55 knots, so we advised the fleet to take shelter. Conditions had moderated considerably by the morning of May 18 and four test boats went out. Two vessels that fished from Rocky Point to Anchor Point had poor luck and moved to Right Hand Point.

By late afternoon on May 18, the samples collected on the west side of Kulukak Bay tested very high, with recoveries ranging from 7% to 11%. A 4-hr gill net opening (the fifth of the season) was announced for 7:30 p.m. on May 18. At that time, we estimated that approximately 65 gill net vessels remained on the grounds. An intensive effort was mobilized to sample the harvest during the fishery, and to determine the quality and quantity of the catch so that we could consider an extension. We asked the fleet to standby at 10:30 p.m. and by that time it was clear that although the volume of the catch was not large, fishing was steady, and the quality was excellent. Recoveries from the fish sampled during the early evening ranged from a low of 8.5% to a high of 14%. The decision at 10:30 p.m. was an easy one and the fishery was extended for an additional 10-hr period. We again felt that it was prudent to allow a closure following the overnight extension to tally the harvest and assess the quality. The water continued to remain turbid and few fish were visible in the district on May 19. Approximately 200 tons remained on the gill net quota, some evidence of a shift in the age composition was present, and we were anxious to complete the fishery before an abundance of recruit herring arrived on the grounds.

Test boats collected samples on the east side of Right Hand Point on the morning of May 20. Samples south of Metervik Bay had lower recoveries than those on the west side of Kulukak Bay, so the area south of Metervik Bay was not considered for a fishery. However, samples from west Kulukak were averaging 11% to 12%, which is almost unheard of in the Togiak gill net fishery. Due to a falling tide, a 4-hr opening was announced with rather short notice, to begin at 12:30 p.m. on May 20, and the fleet was advised to standby at 3:00 p.m. for an update on a possible extension.

The geographic area in which fishing was permitted was quite small, and therefore easy to sample with a Department skiff and the helicopter. The tenders containing roe technicians were anchored nearby, and we were able to get a quick

response on the quality during the opening. Samples were tested from five fishing vessels in the area and roe recoveries ranged from a low of 8.7% to a high of 15.4%. The fishery was extended for a 7-hr period from 4:30 p.m. until 11:30 p.m., and the fleet was asked to standby at 10:00 p.m. for the next update.

Samples collected (from 8:00 to 10:00 p.m.) during the fishery resulted in roe recoveries that ranged from 8.9% to an amazing 16.0%. The quality was the best we have ever observed, but the volume of the harvest was low. With an estimate of only 48 boats still fishing, it was clear that another extension would be necessary before the gill net quota would be met. At 10:00 p.m. an additional 9-hr extension was announced, with the closure to occur at 8:30 a.m., May 21. The fleet was also advised to standby at 7:30 a.m. for the next update.
In the early morning hours of May 21, we estimated that 70.5 tons had been landed overnight, and that most of the boats had recently delivered. Roe recoveries remained high based on reports from the processors, and appeared to be averaging between 9% and 11%. A stiff westerly breeze had been blowing overnight, but the fleet was protected in the lee of the high bluffs along the west side of Kulukak Bay and the fishery was not adversely impacted.

Due to our desire to complete the fishery before the arrival of recruit herring, and the continued excellent quality of the harvest, we elected to allow the fishery to continue, and extended one final time for an additional 7-hr period, until 3:30 p.m. May 21 (Table 2). As luck would have it, the fishing improved on the change of the tide, and the gill net harvest went 64 tons over their quota of 3,000 st.

METHODS

Abundance Estimates

Aerial surveys are conducted daily, when possible, throughout the herring season to determine daily abundance, distribution, and spawn distribution in the Togiak District. Procedures for abundance estimation follow those documented in Lebida and Whitmore (1985), and have not changed in recent years. Surface area of each school is estimated, to which standard factors of 1.52 (water depths of 16 ft or

less), 2.56 (water depths between 16 and 26 ft) and 2.83 st/538 ft^2 (water depths greater than 26 ft) are applied. The resulting biomass of the individual schools are summed to obtain an estimate of biomass present in each section. Location and extent of milt, numbers of fishing vessels, and visibility factors affecting survey quality are also recorded.

Age, Size, and Sex Sampling

Test fishing is conducted with variable mesh gill nets and commercial seine gear to determine age, size, and sex of herring escapement. Test fishing is conducted from Department skiffs stationed at remote field camps in Metervik Bay, Tongue Point, and Summit Island, and by volunteer gill net boats. Variable mesh gill nets are used to obtain samples. Samples of the sac roe harvest are obtained from commercial seine and gill net vessels and are processed at one of the locations above to determine age, size, and sex of the harvest.

Roe Maturity Sampling

Extensive test fishing is conducted by volunteer purse seine and gill net vessels throughout the season to monitor the roe maturity of herring concentrations on the grounds. Samples are delivered from the fishing vessels to processing vessels, where testing for roe recovery is conducted by industry technicians. When possible, samples are delivered from vessel to processor via the Department helicopter. Bagged samples are placed in a brailer bag attached to a longline, and slung to processing vessels. An effort is made by the helicopter pilot to distribute samples from one fishing vessel to several companies to reduce bias associated with any one company. Testing conducted by the industry in this manner places responsibility with the industry and reduces any public concern associated with potential differences in testing procedures. Roe recoveries are relayed by VHF to the Department within minutes after the tests are complete.

HERRING SEASON SUMMARY

Spawning Population

Thirty aerial surveys were flown on 28 days during the season, from April 22 - June 5 (Table 1). Survey conditions, although quite variable, were generally difficult throughout much of the season. A series of moderate wind storms caused the water to remain turbid in much of the district for many days, allowing only partial surveys and preventing a complete assessment of the entire population. During several days surveying was impossible due to low cloud ceilings and fog or high winds. Only six complete (end-to-end) district surveys were conducted.

The first herring were observed May 1, although significant volume did not appear until May 7. As much as 5,000 tons of smelt were present on the grounds in the early part of the season and it was extremely difficult to distinguish them from herring as viewed from the air.

The peak herring biomass was observed May 8, and totaled 71,879 tons (Table 1). Post-season data analysis from aerial surveys, test fishing, and commercial harvests resulted in a total spawning biomass estimate of 88,105 tons (Table 5). This is considered a minimal estimate since an additional (undocumented) quantity of herring were present after May 8, evidenced by a shift in the age composition of the late season gill net harvests. The final biomass estimate was nearly 29,000 tons greater than the preseason forecast of 59,218 st.

Age composition was very similar to the preseason projection. Approximately 79% of the total biomass (by weight) was composed of age 9-16 herring (Table 5). Ages 7-8 accounted for 14%, ages 5-6 6%, and newly recruited age 3 and 4 herring represented less than 1% of the total spawning population. Although a significant recruitment of younger age fish (ages 3 and 4) was not evident, there was a noticeable shift to smaller herring during the course of the gill net fishery. Still, a lack of recruit herring in the spawning population has been very evident in the recent past, and the herring sampled in 1990 give no indication of a significant presence of recruits (Appendix Table 4).

Spawning was observed from May 7 - May 31 throughout the district with over seven mi documented as late as May 28 (Table 1). Most of the observed spawn was recorded on May 9 (a single day record of 37.1 mi of milt sighted), only two days after the first significant observation of herring on the grounds (Appendix Table 6). Observed spawn distribution was fairly widespread, with areas of spawn concentration documented in the traditional spawning areas, from Anchor Point to Rocky Point, Metervik Bay, Barge Beach, Right Hand Point, Asigyukpak Spit, Hagemeister Spit, and inside Ungalikthluk Bay.

The feasibility of conducting underwater surveys to estimate spawner abundance and document herring spawn deposition in the Togiak District was investigated during the 1990 season. Several trial dives were conducted, and were initiated within 24 hours after a 25-knot wind. Although turbidity was relatively high, visibility averaged five feet and was not limiting to the divers. This technique appears to be very feasible for documenting spawn deposition densities and distribution and estimating herring spawner abundance in Togiak District, although there are significant logistical problems with the remoteness and size of the area.

Sac Roe Fishery

Ice did not play a significant factor in the arrival of the fleet this season, and virtually all vessels arrived in time to participate in the first opening. Peak counts of 277 purse seine and 221 gill net vessels were documented (Appendix Table 2). This level of participation in the fishery is above average. A total of 16 processors/buyers purchased herring this season, slightly less then the past several years (Table 6, Appendix Table 2).

One 3-hr fishing period was permitted for the purse seine fleet on May 9. Six periods (including several extensions) were allowed for the gill net fleet from May 8 to May 20 and totaled 66 hours for the season (Table 2). The sac roe harvest totaled 12,253 tons for both gear types combined (Table 3). This years' harvest was almost identical to the 12,258 tons harvested in 1989, comprised 70% of the 1981-90 average for Togiak District, and was the highest reported in Alaska for 1990 (Appendix Table 2).

Board directives allocating 75% and 25% of the harvestable surplus to the seine and gill net fleet, respectively, were achieved. The final purse seine (9,240 st) and gill net (3,013 st) harvests comprised 75.4% and 24.6% of the total sac roe harvest (Appendix Table 2). Over 56% of the purse seine catch was taken in areas west of Togiak Bay, while 57% of the gill net catch was taken in the Kulukak section, where the majority of the openings were permitted.

Weighted roe recoveries averaged 9.6% for both gear types combined, and the roe recoveries for the gill net harvest averaged 9.1%, the highest ever recorded for that gear type in the Togiak sac roe fishery (Appendix Table 3). Roe recoveries averaged 9.7% for the purse seine harvest. Normally herring with roe recoveries below 6% are designated as food or bait on the fish tickets, but fish tickets with roe recoveries below 6% and listed as sac roe were tallied as sac roe purchases and included in calculating average roe recoveries.

A very small wastage problem was observed in the gill net fishery this season and few nets were observed lost or abandoned. Fish and Wildlife Protection was able to recover those nets, and to our knowledge, there were no nets in the water when we left the grounds in late May.

Spawn-on-Kelp Fishery

The effort level for the spawn-on-kelp fishery, estimated at 481 kelpers via an aerial count, was the second largest on record (Appendix Table 5). Although the kelp fishery was limited this year, the issue of what crewmembers could legally do to assist the permit holder was unresolved prior to the season. Enforcement was placed in a compromised situation, and some crewmembers were observed picking kelp, but were not cited. It was difficult to estimate the effort under the circumstances, and everyone on the beach was counted as participating (Appendix Table 5). The sharp increase in effort levels during recent years has resulted in very short intense openings and a reduction in the staff's ability to control harvests within specified levels. Hopefully, when the final affect of limited entry is felt, effort will reduce to a more manageable level.

For the third year in a row, the entire quota for spawn-on-kelp (350,000 lbs) was exceeded during one brief harvest period. The 3-hr period, permitted in area K-8 on May 11, comprised the least amount of fishing time for one season ever, and

resulted in the fourth largest harvest in the 22-year history of this fishery (Table 2, Appendix Table 5). A total of 413,844 lbs of herring spawn-on-kelp were harvested, exceeding the quota by over 65,000 lbs, or 19% (Table 4). This year's harvest was 8% higher than the recent year (1981-90) average of 381,664 lbs (Appendix Table 5). The harvest occurred during the three hours prior to a +1.2-ft tide, during daylight hours, and under fair weather conditions.

Using the formula adopted by the Board of Fisheries in 1984, the spawn-on-kelp harvest was converted to a herring equivalent of 1,617 tons (Table 4). This amount was added to the herring harvest to compute total exploitation.

Dutch Harbor Food/Bait Fishery

The 1990 harvest allocation for the Dutch Harbor food/bait fishery was 908 st, and was based on the in-season biomass estimate of 72,000 tons in the Togiak District. Seven purse seine vessels participated in the fishery, and the entire harvest was obtained in nine hours of fishing time (ADF&G 1990). The actual Dutch Harbor food/bait harvest totaled 820 st, and comprised 91% of the allocation.

Exvessel Value

Value of the Togiak District herring harvest to fishermen was estimated at $6.9 million, based on fish tickets submitted to the Department from processors[1] (Appendix Table 7). Sac roe prices were estimated at $550/st for 10% roe, plus or minus $50 for each 1.0% change. Using the estimated average roe recovery of 9.6% for the sac roe harvest yielded an exvessel price of $530/st. Average price for food/bait herring was $50 per tons in the Togiak District. Approximately 12,100 tons of herring landed was purchased for sac roe, while less than 200 tons was taken for food or bait (Appendix Table 2). Exvessel value of the spawn-on-kelp harvest was estimated to be $361,000 based on the 1990 price of $0.87/lb (Appendix Table 7).

[1] Price information listed on fish tickets for sac roe herring is minimal and may be misleading. Most companies pay an "on grounds" base price, with additional post-season settlements after price finalization with the foreign market. At times an increase of up to 30% has been reported, but in 1990 no post-season bonuses were reported.

Prices paid for food/bait herring in Dutch Harbor averaged $350/st, for an exvessel value of $287,000 for the Dutch Harbor fishery (ADF&G 1990).

DISCUSSION

Aside from limiting aerial surveys, weather did not prove to be a significant factor in the management of the 1990 Togiak herring fishery. However, poor weather and water conditions did hinder test fishing efforts on several occasions.

By Board of Fisheries directive, the Togiak District herring fishery was managed with the intent of harvesting 10-20% of the available biomass. The overall exploitation was 17% of the estimated spawning biomass, based on a total harvest, including the Dutch Harbor harvest (820 st), harvested spawn-on-kelp equivalent (1,617 st), and sac roe harvest (12,253 st), of 14,690 tons and a total biomass estimate of 88,105 st. (Appendix Table 3).

Pacific herring returning to the Togiak District are the focus of the largest herring fishery within state waters. However, declines in annual catch and biomass estimates and the recurring absence of recruits are evidence of a continuation in the decline in abundance of Togiak herring. Although the cause of this decline has yet to be identified, continuation of this trend may precipitate a significantly reduced harvest in the future.

BRISTOL BAY HERRING FISHERY

Figures

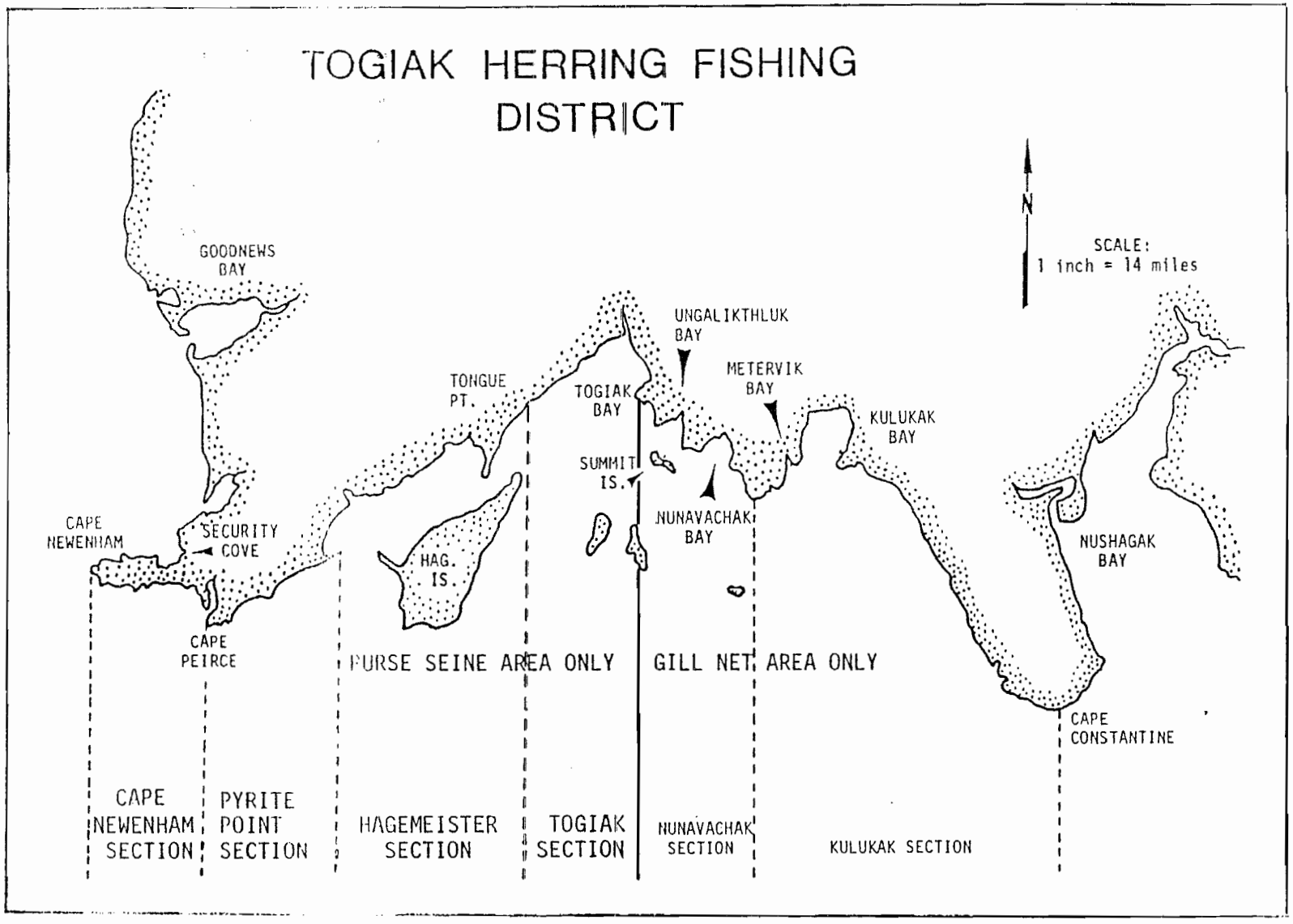

Figure 1. Togiak Herring Fishing District.

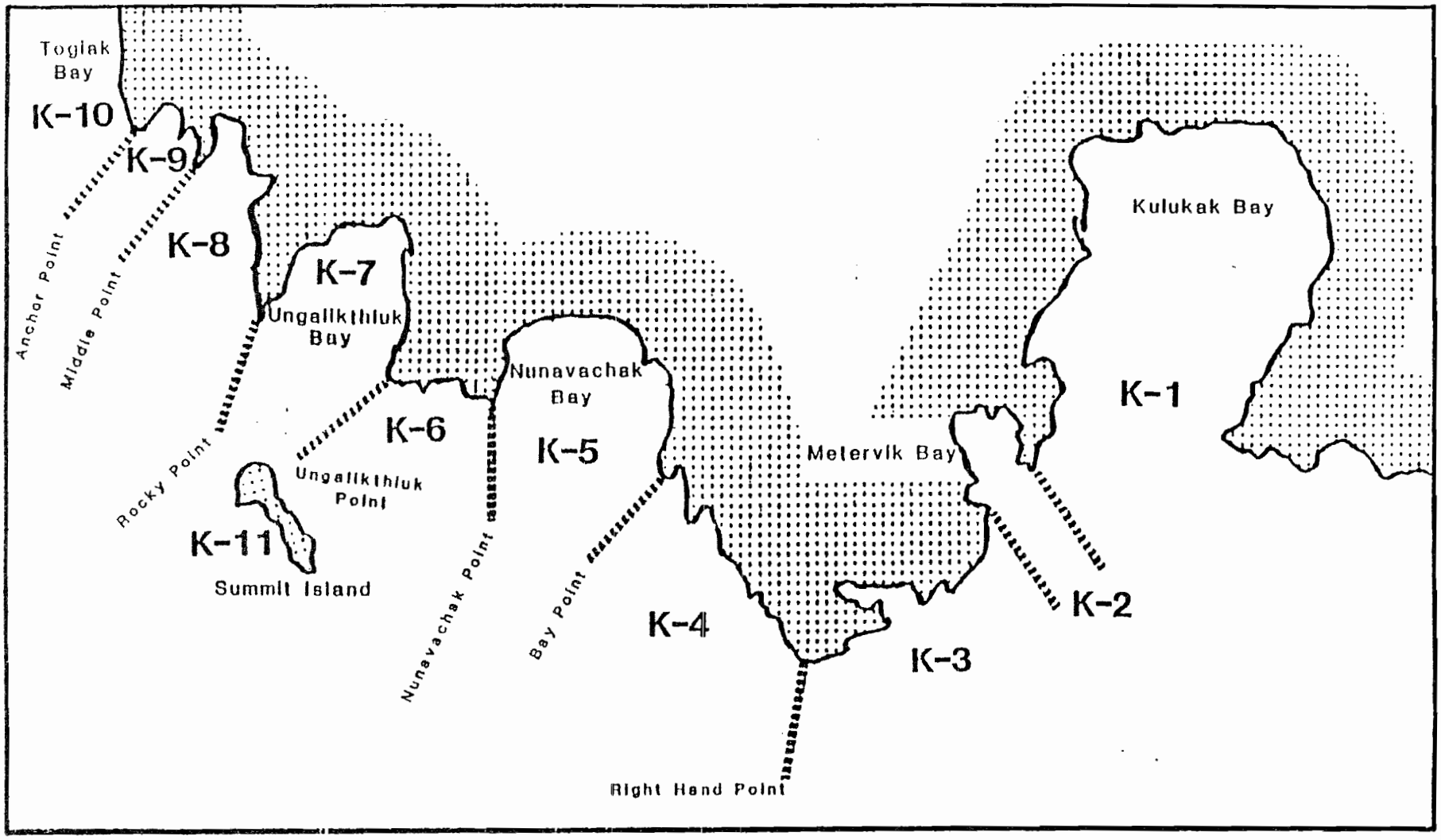

Figure 2. Togiak District Spawn on Kelp Management Areas, Bristol Bay (K-1 through K-11).

BRISTOL BAY HERRING FISHERY

Tables 1-6

Table 1. Daily observed biomass estimates (short tons) and milt sightings of Pacific herring, Togiak District, 1990.[a]

Date	Survey Conditions	Survey Time	Milt Sightings		Estimated Biomass by Index Area[b]												Daily Total
			No.	Length (Mi)	NUS	KUK	MET	NUK	UGL	TOG	TNG	MTG	HAG	OSK	PYR	CN	
4/22	Poor	am	0	0.0	-	0	0	0	0	0	0	0	0	0	-	-	0
4/25	Good	am	0	0.0	0	0	0	0	0	0	-	-	-	-	-	-	0
4/28	Good-Fair	pm	0	0.0	-	0	0	0	0	0	0	0	0	-	-	-	0[c]
4/29	Good-Fair	pm	0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	0[c]
4/30	Good	pm	0	0.0	0	0	0	0	0	0	0	0	0	-	-	-	0[d]
5/01	Good	pm	0	0.0	12	0	0	0	0	0	0	0	0	-	-	-	12[e]
5/02	Fair-Poor	pm	0	0.0	0	0	0	0	0	0	0	0	0	0	-	-	0[f]
5/03	Fair-Poor	pm	0	0.0	-	-	0	0	0	0	0	0	0	-	-	-	0[g]
5/04	Good	pm	0	0.0	-	8	0	0	0	0	0	0	0	0	0	-	8[h]
5/05	Fair	am	0	0.0	-	0	0	0	0	0	0	0	-	-	-	-	0[i]
5/07	Good-Poor	pm	1	0.8	-	0	15	15	844	49	586	22,349	12,501	5,382	0	-	41,741
5/08	Fair	am-pm	11	8.3	-	2	12	296	16,694	8,800	12,674	11,395	21,921	85	-	-	71,879[j]
5/09	Poor-Fair	am-pm	63	37.1	-	-	-	-	-	-	-	-	-	-	-	1,610[k]	1,610
5/10	Good-Poor	am-pm	6	3.3	720	6,127	0	144	-	-	-	-	-	-	-	-	6,991[l]
5/11		pm	5	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-
5/12	Fair	pm	2	1.8	17,906	6,058	1,508	264	2,883	19,109	720	778	187	2,452	43	-	51,908
5/13	Poor	pm	0	0.0	-	-	-	74	651	13,888	0	351	93	409	-	105[k]	15,571
5/14	Fair	am-pm	2	2.0	-	1,137	1,892	314	1,088	4,797	0	870	14	15	-	-	10,127
5/14	Good	pm	1	2.0	-	-	2,360	285	0	-	-	-	-	-	-	-	2,645
5/15	Fair	am	1	1.0	-	-	-	66	85	14,526	-	-	-	-	-	-	14,677
5/16	Poor	am	0	0.0	-	0[m]	2	225	15	0[m]	2	-	0[m]	-	-	-	244
5/18	Poor-Unsat.	pm	0	0.0	-	-	0[m]	1,897[m]	92[m]	-	-	-	-	-	-	-	1,989
5/19	Unsatisfactory	am	0	0.0	-	0	0	0	1,345	0	-	-	-	-	-	-	1,345
5/19	Poor	pm	0	0.0	-	-	0[m]	2,423	0[m]	-	-	-	-	-	-	-	2,423
5/20	Poor-Unsat.	am-pm	0	0.0	-	-	-	110	240[m]	-	-	-	-	-	-	-	350
5/21	Poor	am	0	0.0	-	-	-	498	-	-	-	-	-	-	-	-	498
5/25	Poor-Unsat.	pm	0	0.0	0	0	0	0	622	0[m]	-	-	-	-	-	-	622
5/28[n]		pm	1	7.0	-	-	-	-	-	-	-	-	-	-	-	-	-
5/31	Excellent	pm	1	0.7	2,586	866	4,231	2,049	458	5,425	26	71	67	207	0	0	15,986
6/05	Fair	pm	0	0.0	0	679	160	937	250	8,476	2	18	48	15	0	0	10,585
Total			94	65.7													

[a] Togiak District Pacific herring biomass was estimated at 88,105 short tons for the 1990 season.

[b] The estimate is derived from summing proportions of peak aerial surveys as depicted by changes in age composition.
Index Areas: NUS- Nushagak Peninsula; KUK-Kulukak; MET-Metervik; NUK-Nunavachak; UGL-Ungalikthluk/Togiak; TOG-Togiak; TNG-Tongue Point; MTG-Matogak; HAG;Hagemeister; OSK-Osviak; PYT-Pyrite Point; CN-Cape Newenham.

-continued-

Table 1. (Page 2 of 2)

c Schools of smelt observed in the District.
d Six tons biomass of smelt observed behind Tongue Point (TNG index area).
e 950 ton biomass of smelt observed in combined TOG, TNG, and MTG index areas.
f 1,151 ton biomass of smelt observed in combined UGL, TOG, TNG, and MTG index areas.
g 565 ton biomass of smelt observed in MTG index area.
h 626 ton biomass of smelt observed in the combined UGL, TNG, MTG, and PYR index areas.
i 1,590 tons of smelt observed in the NUK, UGL, TOG and MTG index areas.
j Peak survey.
k Biomass observed along shoreline of Crooked and High Islands.
l Survey of the NUS to NUK index areas indicated eastward movement of additional biomass.
m Partial Survey.
n Area surveyed 28 May. Biomass estimate not quantified. Significant numbers of schools present in the Nunavachak, Kulukak Bay, and Togiak Bay sections. Significant biomass (narrow band, 15 miles in length,) of herring was observed exiting the District along the Nushagak Peninsula.

Table 2. Emergency order commercial herring sac roe and herring spawn-on-kelp fishing periods, Togiak District, Bristol Bay, 1990.

Emergency Orders[1] Number	K Area	Date, Time, and Gear			Duration
I. HERRING SAC ROE					
DLG-01		May 08 4:30 p.m. - May 08 8:30 p.m.	G/N		4.0 hours
DLG-02		May 09 12:00 noon - May 09 3:00 p.m.	P/S		3.0 hours
DLG-03		May 11 4:00 p.m. - May 11 8:00 p.m.	G/N		4.0 hours
DLG-05		May 13 5:30 a.m. - May 13 8:30 a.m.	G/N		3.0 hours
DLG-06		May 14 6:00 p.m. - May 14 10:00 p.m.	G/N		4.0 hours
DLG-07		May 14 10:00 p.m. - May 15 8:00 a.m.	G/N		10.0 hours
DLG-08		May 18 7:30 p.m. - May 18 11:30 p.m.	G/N		4.0 hours
DLG-09		May 18 11:30 p.m. - May 19 9:30 a.m.	G/N		10.0 hours
DLG-10		May 20 12:30 p.m. - May 20 4:30 p.m.	G/N		4.0 hours
DLG-11		May 20 4:30 p.m. - May 20 11:30 p.m.	G/N		7.0 hours
DLG-12		May 20 11:30 p.m. - May 21 8:30 a.m.	G/N		9.0 hours
DLG-13		May 21 8:30 a.m. - May 21 3:30 p.m.	G/N		7.0 hours
II. HERRING SPAWN-ON-KELP					
DLG-04	K-8	May 11 8:30 p.m. - May 11 11:30 p.m.			3.0 hours

[1] Prefix code on emergency orders indicate where announcement originated ("DLG" for Dillingham).

Table 3. Pacific herring catch by fishing period, gear type, and section, in short tons, Togiak District, Bristol Bay, 1990.[a]

Period	Time (hours)	Section						Total
		Kulukak	Nunavachak	Togiak	Hagemeister	Pyrite Point	Cape Newenham	
				Purse Seine				
5/09	3.0	1,293.3	1,758.3	939.1	4,981.3	103.6	130.0	9,205.6
5/14[b]			23.0		4.8			27.8
Total	3.0	1,293.3	1,781.3	939.1	4,986.1	103.6	130.0	9,233.4
				Gill Net				
5/08	4.0	61.5	1,109.9					1,171.4
5/11	4.0	294.7	.5		87.1			382.3
5/13	3.0	89.1						89.1
5/14	14.0	560.8	114.9					675.7
5/18	14.0	451.2						451.2
5/20	27.0	293.8						293.8
Total	66.0	1,751.1	1,225.3		87.1			3,063.5
				Combined Gear				
5/08	4.0	61.5	964.1	145.8				1,171.4
5/09	3.0	1,293.3	1,758.3	939.1	4,981.3	103.6	130.0	9,205.6
5/11	4.0	294.7	0.5		87.1			382.3
5/13	3.0	89.1						89.1
5/14	14.0	560.8	114.9					675.7
5/18	14.0	451.2						451.2
5/20	27.0	293.8						293.8
5/14[b]			23.0		4.8			27.8
Total	69.0	3,044.4	2,860.8	1,084.9	5,073.2	103.6	130.0	12,296.9

[a] Catches reported are preliminary. Final catch for all sections, combined gear, and including ADF&G harvest from aerial survey point estimates totaled 12,253.1 st.

[b] ADF&G harvest resulting from aerial survey point estimates.

Table 4. Commercial herring spawn-on-kelp harvest, by date and area, Togiak District, Bristol Bay, 1990.[a]

Date	Time	Hrs.	Harvest		Equivalent Herring Biomass(st)[b]
			Pounds	Short Tons	
5/11	8:30 p.m. - 11:30 p.m.	3.0	413,844	206.9	1,617
Total		3.0	413,844	206.9	1,617

[a] Spawn-on-kelp was harvested only in Kelping Area K-8.

[b] Using a formula adopted by the 1984 Board of Fisheries, herring spawn-on-kelp harvest is converted to represent herring as follows:

$$\text{Herring Equivalent} = \frac{100\ (\text{Harvested Egg Biomass})}{\text{Average Roe Recovery (in percent)}},$$

where;

$$\text{Harvested Egg Biomass} = 0.75\ (\text{Spawn-on-kelp biomass})$$

For 1990;

$$\text{Herring Equivalent} = \frac{100\ (0.75\ (206.9\ \text{st}))}{9.6}$$

$$= 1{,}617\ \text{st}$$

1,617 short tons is included in the herring harvest to calculate total exploitation.

Table 5. Herring total run and commercial catch by year class, Togiak District, Bristol Bay, 1990.[a]

Year Class	Age	Total Run Short Tons	%	Catch Short Tons	%	Escapement Short Tons	%
1974	16	153	0.2	43	0.3	110	0.1
75	15	246	0.3	82	0.6	164	0.2
76	14	726	0.8	159	1.2	567	0.8
77	13	10,632	12.1	1,453	11.1	9,179	12.2
78	12	23,834	27.1	3,685	28.1	20,149	26.9
1979	11	13,664	15.5	2,149	16.4	11,515	15.4
80	10	5,921	6.7	826	6.3	5,095	6.8
81	9	14,568	16.5	2,320	17.7	12,248	16.3
82	8	3,039	3.4	460	3.5	2,579	3.4
83	7	9,585	10.8	1,375	10.5	8,210	11.0
1984	6	5,366	6.1	542	4.1	4,824	6.4
85	5	256	0.3	31	0.2	225	0.3
86	4	69	0.1	3	0.0	66	0.1
87	3	46	0.1	0	0.0	46	0.1
88	2	0	0.0	0	0.0	0	0.0
1989	1	0	0.0	0	0.0	0	0.0
		88,105[b]		13,128		74,977	

[a] Catch reported here is preliminary, and includes harvest by the Dutch Harbor food and bait fishery (820 tons) and a preliminary harvest for the Togiak sac roe fishery. Escapement reported here, consequently, is also preliminary. The final catch is reported in other tables in this report, however, the numbers in this table are used in forecasting next years' inshore return.

[b] Final biomass estimate.

Table 6. Commercial herring sac roe and herring spawn-on-kelp processors and buyers operating in Togiak District, Bristol Bay, 1990.[a]

Name of Operator/Buyer	Base of Operations	Processing Method		Brine Export	Comments
		Frozen	Cured		
A. HERRING SAC ROE					
1. Anderson Seafoods	M/V Northern Makaka	Floater			
2. Anpac Inc.	M/V Nushagak	Floater			
3. Icicle Seafoods	P/V Bering Star	Floater			
4. King Crab, Inc.	M/V Viva Yo	Shore			
5. Lafayette, Inc.	M/V Pribilof	Floater			
6. New West Fisheries	M/V New West	Floater			
7. Northcoast Seaf. Proc.	P/V Polar Bear	Floater			
8. Oceanic Seafood Co.	M/V Pacific Harvester	Floater			
9. Pan Pacific Seafoods	M/V Pacific Producer	Floater			
10. Peter Pan Seafoods Inc.	P/V Blue Wave	Floater			
11. Snopac Products, Inc.	P/V Snopac	Floater			
12. Togiak Nuka Point		Shore			
13. Trident Seafoods	P/V Neptune	Floater			
14. Wards Cove Packing Co.	M/V Tuxedni	Floater			
15. Woodbine	P/V Woodbine	Floater			
16. YAK, Inc.	P/V Yardarm Knot	Floater			
	TOTAL	16			
B. HERRING SPAWN-ON-KELP					
1. Anpac, Inc.				Floater	
2. Kemp Paulucci				Floater	
3. Northcoast Seaf. Proc.				Floater	
4. Peter Pan Seafoods, Inc.				Floater	
5. Togiak Fisheries				Shore	
6. Whitney Foods, Inc.				Shore	
7. Woodbine				Floater	
	TOTAL			7	

[a] Operators that registered from the Togiak Herring District.

BRISTOL BAY HERRING FISHERY

Appendix Tables 1-7

Appendix Table 1. Aerial estimates of surface area and tonnage conversion of herring schools, Togiak District, Bristol Bay, 1978-90.

Year	Date	Estimated Tons per 538 sq ft.[1]	School Size	Weight of Catch (Tons)	Actual or Est. Weight of Catch	Fish Maturity	Location of Purse Seine Set	Water Depth (ft)
1978	5/13	7.39	[a]	[a]	Estimated	[a]	Nunavachak Bay	[a]
	18	12.13	80 X 60	110	Estimated	[a]	Nunavachak Bay	[a]
1979	5/ 4	2.65	40 dia.	6	Actual	Ripe	Ungalikthluk Bay	20
1980	5/15	1.32	60 X 40	6	Actual	Ripe	Ungalikthluk Bay	10
	15	1.76[b]	40 X 30	4	Estimated	Spawn-outs	Ungalikthluk Bay	26
	16	1.21[b]	220 X 50	21	Actual	Spawn-outs	Nunavachak Bay	16
	16	1.32	65 X 20	3	Estimated	Fish Lost	1 Mile West Ungalikthluk Bay	16
	20	3.31	70 X 70	30	Estimated	Ripe	East of Eagle Bay	20
	20	2.87	150 X 75	59	Estimated	Fish Lost	Eagle Bay	20
1981	5/ 3	1.21	400 X200	88	Actual	Ripe	West Side, Tongue Pt.	7
	8	1.87	80 X 30	8	Actual	Spawn-outs	Togiak Bay, Mouth	20
	10	4.41	150 X 60	44	Actual	Ripe	Asigyukpak Spit Bight	26
1982	5/15	2.09	200 X150	110	Estimated	Green	Kulukak Bay	26
1983	4/30	1.21	150 X180	60	Estimated	Green	Togiak Bay	13
	30	1.10	350 X143	100	Estimated	Green	Togiak Bay	10
	30	1.65	60 X 30	3	Estimated	Green	Togiak Bay	26
	5/11	1.98	200 X200	140	Estimated	Ripe and Spawn-outs	Togiak Bay	10
	18	1.87	300 X 50	50	Estimated	Spawn-outs	Nushagak Peninsula	13
	18	2.43	60 X 60	15	Estimated	Spawn-outs	Nushagak Peninsula	13
1986	5/17	2.15	100 X100	40	Estimated	Spawn-outs	Togiak Bay	13
	17	5.38	100 X 30	30	Estimated	Spawn-outs	West Side Tongue Pt.	17
	19	1.15	100 X 50	11	Actual	Ripe	West Side, Kulukak Bay	8
	19	1.12	100 X100	21	Actual	Ripe	West Side, Kulukak Bay	10
	20	1.08	100 X100	20	Estimated	Spawn-outs/ Immature	East Side, Tip of Hagemeister Island	12
	21	11.86	70 X 70	108	Actual	Ripe	Gravel Beach, Nunavachak Section	5
1987	5/ 9	5.49	70 X 70	released			Asigyukpak Spit	10
	11	3.40	70 X 70	31	Actual	Ripe	Tongue Point	13
	11	1.26	100 X100	24	Actual	Ripe	Tongue Point	11
1988	5/24	2.69	50 X 50		Actual	Ripe	Gravel Beach Nunavachak Section, North of Summit Island	12
1989	No point estimates were conducted							
1990	5/12	0.26	75 X 75	5[c]	Actual	Ripe	Asigyukpak Spit	12
	14	1.55	51 X 61	5[d]	Actual	Ripe	Rocky Bay	12
	14	0.80	100 X 54	8	Actual	Ripe	Rocky Bay	18
	18	2.73	100 X 70	10	Actual	Mixed	Nunavachak-Airport	20

[1] Surface area for each school is expressed as a multiple of 538 sq ft. or 50 sq.m. This is the maximum area of a "small" school and is equal to one relative abundance index (RAI)

[a] Incomplete data.

[b] Average of two observers' estimates.

[c] School partially capelin, only herring were pumped.

[d] Adjusted to 100% capture would total 11 tons.

Appendix Table 2. Commercial herring catch by gear type and product, Togiak District, Bristol Bay, Alaska, 1971-90.

Year	Number of Processors	Units of Gear[1] Gill Net	Units of Gear[1] Purse Seine	Percent Catch Gear Gill Net	Percent Catch Gear Purse Seine	Percent Catch Product Sac Roe	Percent Catch Product Food/ Bait	Inshore Catch[2] (st)
1971[a]								
72	1	18	1	40	60	100	0	80
73	2	26	1	100	0	100	0	51
74	3	10	1	16	84	100	0	123
75	2	39	0	100	0	100	0	56
1976[a]								
77	6	43	6	11	89	100	0	2,795
78	16	40	25	8	92	100	0	7,734
79	33	350	175	40	60	92	8	11,558
80	27	363	140	16	84	85	15	18,886
1981	28	106	83	18	82	99	1	12,542
82	33	200	135	31	69	93	7	21,489
83	23	250	150	19	81	97	3	26,287
84	25	300	196	25	75	98	2	19,300
85	23	302	155	17	83	99	1	25,616
1986	23	209	209	21	79	99	1	16,260
87	18	148	111	17	83	98	2	15,204
88	22	300	239	26	74	99	1	14,382
89	19	320	310	24	76	97	3	12,258
90	16	277	221	25	75	99	1	12,253
20-Year Ave.	18	183	120	31	69	98	3	12,049
1971-80 Ave.	11	111	44	41	59	97	3	5,160
1981-90 Ave.	23	241	181	22	78	98	2	17,559

[1] Units of gear derived from fish tickets in years prior to 1979. From 1979 to present, units of gear equals peak aerial count.

[2] Catch prior to 1973 reflects sorted females only.

[a] Fishery not conducted.

Appendix Table 3. Estimated herring biomass and inshore commercial catch, in short tons, Togiak District, Bristol Bay 1978-90.

Year Class	Total Run	Inshore Catch	Roe Recovery (%) Gill Net	Purse Seine	Mean	Percent Exploitation[1]
1978	190,292	7,734			8.2	4
79	239,022	11,558			8.6	5
80	68,686	18,886			9.2	35
81	158,650	12,542	6.7	10.1	9.1	8
82	97,902	21,489	7.4	9.5	8.8	22
1983	141,782	26,287	6.9	9.3	8.9	19
84	114,880	19,300	8.4	10.2	9.8	18
85	131,400	25,616	7.4	10.0	9.6	20
86	94,700	16,260	8.8	9.9	9.7	19
87	88,400	15,204	8.6	8.9	8.8	19
1988	134,717	14,382	8.3	10.9	10.3	13
89	98,965	12,258	8.0	8.6	8.4	18
90	88,105	12,253	9.1	9.7	9.6	17

[1] The percent exploitation is calculated by dividing the adjusted total harvest, which includes all commercial landings (Togiak sac roe fishery and Dutch Harbor food/bait fishery), all documented waste, and the herring equivalent of the spawn-on-kelp removal, by the total run.

(Source 1)

Appendix Table 4. Age composition of the inshore herring run, Togiak District, Bristol Bay, 1977-1990.

Year	Age Composition(%)[1]							Total Run (st)[2]
	3[a]	4	5	6	7	8	9+	
1977	4	49	37	3	3	3	1	
78	11	44	33	9	1	1	1	190,292
79	3	9	43	35	9		1	239,022
80	3	4	2	39	37	15	2	68,686
81	2	48	5	1	25	15	4	158,650
1982		16	56	3	1	13	11	97,902
83		4	33	47	2	2	12	141,782
84		2	8	32	40	5	13	114,880
85		25	3	8	29	41	14	131,400
86			7	4	18	40	31	94,770
1987		2	1	11	10	28	50	88,400
88			5	1	13	5	74	134,717
89		0	3	6	3	16	72	98,965
90[b]				6	11	3	79	88,105

[1] Age composition in 1979-90 is weighted by area based on aerial survey data and by weight at age; age composition in 1977 and 1978 is not weighted.

[2] Includes commercial catch, escapement, and documented waste.

[a] Includes age 1, 2 and 3.

[b] Contributions of age 1, 2, 3, 4 and 5, are less than 5% each.

Appendix Table 5. Commercial harvest of herring spawn-on-kelp, Togiak District, Bristol Bay, 1971-90.

Year	Processors	Permit Holders	Deliveries	Harvest (lbs)
1971	1	12	43	51,795
72	1	12	32	64,165
73	1	10	11	11,596
74	3	26	49	125,646
75	2	44	98	111,087
1976	5	49	118	295,780
77	5	75	266	275,774
78	11	160	349	329,858
79	16	100	228	414,727
80	21	78	186	189,662
1981	7	108	277	378,207
82	8	214	167	234,924
83	4	125	257	270,866
84	6	330	412	406,587
85[a]				
1986	3	204	351	374,142
87	5	187	334	307,307
88	10	259	330	489,320
89	11	487	330	559,780
90	7	481[b]	286	413,844
20-Year Ave.	7	156	217	279,214
1971-80 Ave.	7	57	138	187,009
1981-90 Ave.	7	266	305	381,664

[a] Fishery not conducted.
[b] Estimated via aerial survey during the harvest; includes both limited-entry interim-use permit holders and crew members.

Appendix Table 6. Aerial observations of herring spawn in the Togiak District, Bristol Bay, 1978-1990.[a]

Date	1978		1979		1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990	
	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles	No.	Miles
4/24																			15	2.9						
25																			17	5.2						
26																			15	3.4						
27																			24	4.3						
28																			0							
29																			0							
30			2	2.5			9	3.0			0								7	1.7						
5/ 1	1	0.4					6	2.3			0								0							
2			21	8.3	11	4.0	12	1.9			10	3.6														
3	1	0.4	14	5.0	8	3.0	12	6.8			30	9.3							21	10.7						
4			8	3.1			4	2.9			40	12.5							15	6.3						
5			1	1.3	0		6	2.5			27	7.5							21	23.9						
6							0				8	2.9							9	8.4						
7			3	0.6	3	0.9	2	0.4	0		8	1.5							7	3.3					1	0.8
8	2	1.8			3	1.2	3	1.0			8	1.9											4	4.2	11	8.3
9			2	0.4	1	0.2	5	1.4					1	+					0				11	11.9	63	37.1
10			0				0		0										2	0.4			15	12.9	6	3.3
11	9	7.7			0						3	3.5							6	4.7	0		7	10.0	5	1.7
12	3	1.5	0		0		15	4.8	0		9	5.4									0		9	3.6	2	1.8
13	12	8.6			0		6	3.8	0		0						2	0.8			0		4	3.2	0	
14	11	5.6	0		2	2.3	10	4.7	0								29	13.8	1	0.6	2	1.5			3	4.0
15					6	4.0	2	1.5	0		2	1.0					53	18.2							1	1.0
16			0		4	1.2	0		1	0.1	4	0.5	1	0.3			34	11.1			11	3.5	1	0.8	0	
17			0						4	0.7	9	2.0	1	0.5			24	11.7			20	22.8				
18	11	4.2							29	7.3	19	6.1	24	17.6			3	0.6			30	12.9			0	
19	3	2.5			1	0.3			16	5.2	7	1.7	71	24.6			1	0.6			26	9.1			0	
20					4	0.9			19	14.0	0		8	1.3	3	0.2	3	0.6							0	
21			0						3	2.0			0		8	2.0	11	4.2			3	0.9				
22					2	0.5			3	1.5			5	1.2	13	2.3	4	0.5			9	4.1				
23							10	2.1	11	3.3	0		3	1.4	48	14.2	4	1.5			1	3.5				
24									5	1.4			6	2.2	25	11.7	11	2.6			5	2.8	18	5.9		
25	8	4.2							1	0.3	1	0.1	3	1.4	17	5.2										

-continued-

Appendix Table 6. (Page 2 of 2)

Date	1978 No.	1978 Miles	1979 No.	1979 Miles	1980 No.	1980 Miles	1981 No.	1981 Miles	1982 No.	1982 Miles	1983 No.	1983 Miles	1984 No.	1984 Miles	1985 No.	1985 Miles	1986 No.	1986 Miles	1987 No.	1987 Miles	1988 No.	1988 Miles	1989 No.	1989 Miles	1990 No.	1990 Miles
26	2	2.2	1	0.7			3	0.2	0		1	0.1	14	4.1	23	7.3										
27					3	0.3			0		2	0.1	8	1.2			0									
28	0								0				3	0.1											1	7.0
29					8	1.6			0				2	0.2	0											
30	6	1.6							0		0		4	0.5			3	0.3								
31					2	0.8			0				12	4.1											1	0.7
6/ 1									7	2.6	0		3	0.5	4	0.5										
2	1	0.5							0																	
3							1	0.8	4	0.2	1	+														
4													2	0.2												
5																										
6																	0									
7					6	3.1																				
Total	70	41.2	52	21.9	64	24.3	106	40.1	103	38.6	189	59.7	171	61.4	141	43.4	182	66.5	160	75.8	107	61.1	69	52.5	94	65.7

[a] Survey area covers Nushagak Peninsula to Cape Newenham.

Appendix Table 7. Exvessel value of the commercial herring and spawn-on-kelp harvest, in thousands of dollars, Togiak District, Bristol Bay, 1970-89.[a]

Year	Herring		Spawn on Kelp	Total
	Sac Roe	Food/Bait		
1971	[b]	[b]	8	8
72	4	0	9	13
73	2	0	2	4
74	24	0	19	43
75	9	0	22	31
1976	[b]	[b]	127	127
77	447	0	116	563
78	2,635	0	120	2,755
79	6,561	180	249	6,990
80	3,055	150	95	3,300
1981	3,988	1	250	4,239
82	6,070	105	176	6,351
83	10,450	67	284	10,801
84	7,178	33	203	7,414
85	13,696	41	[b]	13,737
1986	8,648	12	187	8,847
87	8,614	49	166	8,829
88	14,103	3	346	14,452
89	4,983	19	448	5,450
90	6,494	9	360	6,863
20-Year Ave.	5,387	37	168	5,041
1971-80 Ave.	1,592	41	77	1,383
1981-90 Ave.	8,422	34	269	8,698

[a] Exvessel value (value paid to the fisherman) is derived by multiplying price per pound by the commercial harvest.

[b] Fishery not conducted.

BRISTOL BAY

HERRING FISHERY

APPENDIX

Appendix A. Alaska Board of Fisheries regualtory action and management policy changes affecting the commercial herring fishery in Bristol Bay, 1990.

Proposal #	Action
20c	This proposal eliminated the line that is used to separate the two gear types. See rewrite of Proposal 20c and Proposal 23 as "Amended Bristol Bay Herring Management Plan"
23	This proposal reduced the length and amount of purse seine and gill net gear. See rewrite of Proposal 20c and Proposal 23 as "Amended Bristol Bay Herring Management Plan"
4	This proposal increased the maximum gill net mesh size from 3" to 3.5".

BRISTOL BAY SALMON FISHERY

Tables 1-40

Table 1. Comparison of inshore sockeye salmon forecast versus actual run, escapement goals versus actual escapements, and projected versus actual commercial catch, by river system and district, in thousands of fish, Bristol Bay, 1990.[a]

District and River System	Inshore Run			Escapement				Inshore Catch		
	Forecast	Actual[1]	Percent Deviation	Goal	Range	Actual[1]	Percent Deviation	Projected Harvest	Actual[1]	Percent Deviation
NAKNEK-KVICHAK DISTRICT										
Kvichak River[2]	8,922	17,439	-49	6,000	6,000-10,000	6,970[b]	-14	2,922	10,469	-72
Branch River[2]	401	550	-27	185	170- 200	169[b]	10	216	382	-43
Naknek River	3,636	8,369	-57	1,000	800- 1,400	2,093	-52	2,636	6,276	-58
Total	12,959	26,358	-51	7,185	6,970-11,600	9,231	-22	5,774	17,127	-66
EGEGIK DISTRICT	5,582	12,279	-55	1,000	800- 1,200	2,192	-54	4,582	10,087	-55
UGASHIK DISTRICT	3,079	2,893	6	700	500- 900	749[c]	-7	2,379	2,144	11
NUSHAGAK DISTRICT										
Wood River	1,906	2,647	-28	1,000	700- 1,200	1,069	-6	906	1,577	-43
Igushik River	612	1,267	-52	200	150- 250	366[b]	-45	412	902	-54
Nush/Mul River[2]	935	1,765	-47	500	340- 760	675[b]	-26	435	1,090	-60
Total	3,454	5,679	-39	1,700	1,150- 2,150	2,110	-19	1,754	3,569	-51
TOGIAK DISTRICT	323	373	-13	150	140- 250	189	-21	173	184	-6
TOTAL BRISTOL BAY	25,397	47,582	-47	10,735	7,630-12,210	14,471	-26	14,662	33,111	-56

[a] The Bristol Bay inshore forecast does not include several minor river systems, including the Snake River drainage in Nushagak District, and the Kulukak, Osviak, Matogak, and Slug River systems in Togiak District. Catches, escapements, and total runs for these smaller systems are not included in this table for the sake of comparison. Therefore, actual District totals reported here may represent only a portion of the District, and actual Bristol Bay totals reported here include only a portion of the Bristol Bay catch, escapement, and inshore run. Totals may not equal column sums due to rounding.

[b] Preliminary.

[c] Includes Mother Goose and Dog Salmon River systems.

[1] Unless otherwise noted, inshore total runs and catches are preliminary, while escapement data is final.

[2] These systems cannot be managed separately from the major system in the district.

Table 2. Inshore forecast of sockeye salmon returns by age class, river system and district, in thousands of fish, Bristol Bay, 1990.

District and River System	Age Class (Brood Year) 1.2 (1986)	2.2 (1985)	2-Ocean	Age Class (Brood Year) 1.3 (1985)	2.3 (1984)	3-Ocean	Total
NAKNEK-KVICHAK DISTRICT							
Kvichak River	1,300	5,684	6,984	1,083	855	1,938	8,922
Branch River	177	24	201	190	10	200	401
Naknek River	644	787	1,431	1,435	770	2,205	3,636
Total	2,121	6,495	8,616	2,708	1,635	4,343	12,959
EGEGIK DISTRICT	731	3,042	3,773	815	994	1,809	5,582
UGASHIK DISTRICT	755	1,061	1,816	708	555	1,263	3,079
NUSHAGAK DISTRICT							
Wood River	812	57	869	989	48	1,037	1,906
Igushik River	97	30	127	451	34	485	612
Nuyakuk River	169	15	184	727	24	751	935
Total	1,078	102	1,180	2,167	106	2,273	3,454
TOGIAK DISTRICT	90	23	113	185	25	210	323
TOTAL BRISTOL BAY[1]							
Number	4,775	10,723	15,498	6,583	3,315	9,898	25,397
Percent	19	42	61	26	13	39	100

[1] Sockeye salmon of several minor age classes are expected to contribute an additional 1-2% to the total return.

Table 3. Inshore run of sockeye salmon by age class, river system and district, in thousands of fish, Bristol Bay, 1990.[a]

District and River System		1.2	2.2	2-ocean	1.3	2.3	3-Ocean	Total
NAKNEK-KVICHAK DISTRICT								
Kvichak River								
	Number	660	13,078	13,738	1,239	2,393	3,632	17,370
	Percent	4	75	79	7	14	21	100
Branch River								
	Number	330	89	419	109	22	131	550
	Percent	60	16	76	20	4	24	100
Naknek River								
	Number	1,901	1,255	3,156	3,412	1,759	5,171	8,327
	Percent	23	15	38	41	21	62	100
Total	Number	2,891	14,422	17,313	4,760	4,174	8,934	26,247
	Percent	11	55	66	18	16	34	100
EGEGIK DISTRICT								
	Number	1,758	4,168	5,926	1,331	4,740	6,071	11,997
	Percent	15	35	49	11	40	51	100
UGASHIK DISTRICT								
	Number	478	947	1,425	692	686	1,378	2,803
	Percent	17	34	51	25	24	49	100
NUSHAGAK DISTRICT								
Wood River								
	Number	1,157	29	1,186	1,373	21	1,394	2,580
	Percent	45	1	46	53	1	54	100
Igushik River								
	Number	228	84	312	903	34	937	1,249
	Percent	18	7	25	72	3	75	100
Nush-Mulchat. River								
	Number	111	6	117	591	6	597	714
	Percent	15	1	16	83	1	84	100
Total	Number	1,496	119	1,615	2,867	61	2,928	4,543
	Percent	33	3	36	63	1	64	100
TOGIAK DISTRICT								
	Number	81	36	117	210	19	229	346
	Percent	23	10	34	61	5	66	100
TOTAL BRISTOL BAY[1]								
	Number	6,704	19,692	26,396	9,860	9,680	19,540	45,936
	Percent	15	43	58	21	21	42	100

[1] Approximately 1,652,000 additional sockeye salmon of several minor age classes returning in 1990 are not included in this total.

[a] The inshore run data does not include the 1990 Japanese high seas catch of maturing Bristol Bay sockeye or the 1989 Japanese catch of immatures.

Table 4. Inshore commercial catch and escapement of sockeye salmon, Bristol Bay, in numbers of fish, 1990.[a]

District and River System	Catch	Escapement	Total Run
NAKNEK-KVICHAK DISTRICT			
Kvichak River	10,468,631	6,970,020	17,438,651
Branch River	381,911	168,578[b]	550,489
Naknek River	6,276,083	2,092,578	8,368,661
Total	17,126,625	9,231,176	26,357,801
EGEGIK DISTRICT	10,086,953	2,191,582[c]	12,278,535
UGASHIK DISTRICT			
Ugashik River		730,038	
Dog Salmon River		8,100	
Mother Goose System		11,340	
Total	2,144,268	749,478	2,893,746
NUSHAGAK DISTRICT			
Wood River	1,577,328	1,069,440	2,646,768
Igushik River	901,557	365,850	1,267,407
Nushagak/Mul. System	1,090,423	674,596[b]	1,765,019
Snake River		28,840	28,840
Total	3,569,308	2,138,726	5,708,034
TOGIAK DISTRICT			
Togiak Lake	184,285	141,977	326,262
Togiak River and Tributaries		47,145[d]	47,145
Kulukak System	41,698	49,600[d]	91,298
Other Systems[1]	11,516	39,480[d]	50,996
Total	237,499	278,202	515,701
TOTAL BRISTOL BAY	33,164,653	14,589,164	47,753,817

[1] Catch includes Matogak and Osviak Sections; escapement includes Negukthlik, Ungalikthluk, Osviak, Matogak and Slug River systems.

[a] Inshore catch apportionment by river system is preliminary until results from scale pattern analysis become available; escapements are final unless noted otherwise.

[b] Preliminary.

[c] Includes Egegik River tower count and peak aerial counts for King Salmon River and Shosky Creek.

[d] These estimates are based on unpublished aerial survey data obtained from the U.S Fish and Wildlife Service.

Table 5. Inshore commercial catch and escapement of pink salmon, in number of fish, Bristol Bay, 1990.[a]

District and River System	Catch	Escapement[1]	Total Run
NAKNEK-KVICHAK DISTRICT			
Kvichak River		47,000	
Branch River		240,500	
Naknek River		65,000	
Total	447,757	352,500	800,257
EGEGIK DISTRICT	7,149	17,000	24,149
UGASHIK DISTRICT	260	2,000	2,260
NUSHAGAK DISTRICT			
Nushagak River		801,430[b]	
Total	53,286	801,430	854,716
TOGIAK DISTRICT			
Togiak Section	7,893	197,600[c]	
Kulukak Section	53	3,800	
Osviak Section	139	22,400[d]	
Matogak Section	929		
Total	9,014	223,800	232,814
TOTAL BRISTOL BAY	517,466	1,396,730	1,914,196

[1] Estimated by aerial survey unless otherwise noted.
[a] Inshore district catches are preliminary, while escapements are final.
[b] Preliminary sonar count.
[c] Includes only Togiak River and tributaries.
[d] Includes Slug, Osviak, Matogak, Quigmy, Negukthluk, & Ungalikthluk Rivers.

Table 6. Offshore test fishing catch indices and estimated inshore daily passage rate of sockeye salmon, Port Moller, Bristol Bay, 1990.

Date	No. of Stations Fished	Sockeye Catch	Running Mean Weight (lbs.)	Running Mean Length (mm)	Index[1] Daily	Index[1] Cum.	Passage Rate[2] Daily	Passage Rate[2] Cum.
6/11	4	17	.00	515	8.87	9	194	194
12	4	23	.00	531	12.82	22	280	474
13	0	(25)	.00	531	(13.37)	35	292	766
14	3	(23)	.00	534	(12.34)	47	270	1,036
15	3	(40)	.00	529	(21.14)	69	462	1,498
16	0	(41)	.00	529	20.81	89	455	1,953
17	4	41	.00	535	19.88	109	435	2,387
18	4	99	.00	534	46.31	156	1,012	3,400
19	0	(106)	.00	534	(49.50)	205	1,082	4,481
20	0	(115)	.00	534	(53.30)	258	1,165	5,646
21	0	(121)	.00	534	(55.36)	314	1,210	6,856
22	4	128	.00	536	57.73	371	1,262	8,118
23	4	145	.00	540	68.94	440	1,507	9,624
24	4	352	.00	542	147.37	588	3,221	12,845
25	4	417	.00	541	160.01	748	3,497	16,342
26	4	247	.00	543	118.44	866	2,588	18,930
27	4	334	.00	544	146.54	1,013	3,203	22,133
28	4	747	.00	543	302.41	1,315	6,609	28,742
29	4	566	.00	544	226.94	1,542	4,960	33,702
30	4	638	.00	544	285.19	1,827	6,233	39,935
7/ 1	4	390	.00	544	207.50	2,035	4,535	44,470
2	4	282	.00	544	168.13	2,203	3,674	48,145
3	3	(491)	.00	545	(227.30)	2,430	4,968	53,112
4	4	218	.00	544	117.55	2,548	2,569	55,681
5	4	169	.00	544	76.07	2,624	1,663	57,344
6[a]								

1 Indices expressed in fish/100 fathom hours and includes interpolations for missed days and stations (in brackets).

2 Estimated passage rate is expressed in thousands of fish and is adjusted throughout the season based on catchability and/or lag time. Passage rate is based on the mean inshore return per Port Moller index (1985, 1987, 1988 and 1989) of 21,855 fish multiplied by the daily index.

a Final passage using a 7-day lag time was 35,809,140 sockeye, however the use of lag time for forecasting run strength was consistantly under-forecasting. Final passage using the mean return per index was estimated July 6 at 57,343,879 sockeye.

Table 7. Offshore test fishing catch indices and estimated inshore daily passage rate of chum salmon, Port Moller, Bristol Bay, 1990.

Date	No. of Stations Fished	Chum Catch	Index[1] Daily	Index[1] Cum.	Passage Rate[2] Daily	Passage Rate[2] Cum.
6/11	4	1	.52	1	8	8
12	4	7	3.94	4	59	66
13	0	(4)	(2.16)	7	32	99
14	3	(1)	(.53)	7	8	106
15	3	(7)	(3.76)	11	56	162
16	0	(0)	(.00)	11	0	162
17	4	13	6.47	17	96	259
18	4	12	5.42	23	81	339
19	0	(10)	(4.64)	27	69	408
20	0	(7)	(3.30)	31	49	457
21	0	(4)	(1.88)	33	28	485
22	4	2	.86	33	13	498
23	4	8	3.83	37	57	555
24	4	16	7.40	45	110	665
25	4	9	3.48	48	52	717
26	4	16	7.59	56	113	830
27	4	25	11.71	67	174	1,004
28	4	17	7.02	75	104	1,109
29	4	22	8.75	83	130	1,239
30	4	11	6.01	89	89	1,328
7/ 1	4	8	4.36	94	65	1,393
2	4	7	4.33	98	64	1,458
3	3	(8)	(3.52)	101	52	1,510
4	4	8	5.04	107	75	1,585
5	4	28	14.51	121	216	1,801

[1] Indices expressed in fish/100 fathom-hours and includes interpolations for missed days and stations (in brackets).

[2] Estimated passage rate is expressed in thousands of fish and is based on the mean inshore return per Port Moller index (1985, 1987, 1988, and 1989) of 14,883 fish multiplied by the daily index.

Table 8. Summary of district sockeye salmon test fishing indices in the Naknek-Kvichak District, by index area and date, Bristol Bay, 1990.[a]

Index Area	Date[1] June 25	June 26	June 27	June 28
Naknek River Mouth	386[b]	249[c]	29[d]	361[d]
Pederson Point	69	18		69[b]
Cutbank & Graveyard	24[c]	457[c]	39[d]	74
Salmon Flats	9		0	360[b]
Gravel Spit	5[b]	0	0	923[b]
Ships Anchorage	53[d]	130[d]	389[c]	33
Half Moon Bay		0	322	
Middle Naknek	103[b]	18[b]	27[f]	
Johnson Hill	30	0		
Division Buoy	157	0	47[f]	
Deadman Sands			112[b]	
Low Point			0	
Middle Bluff				

[1] Two test boats fished simutaneously on June 27 and June 28.

[a] All indices expressed in number of fish/100 fathom-hours to the nearest full index point.

[b] Average of two drifts in the same general index area.

[c] Average of three drifts in the same general index area.

[d] Average of four drifts in the same general index area.

[e] Average of five drifts in the same general index area.

[f] Average of six drifts in the same general index area.

Table 9. Summary of district sockeye salmon test fishing in the Egegik District, by index area and date, Bristol Bay, 1990.[a]

Index Area	Date	
	June	July

No district test fishing conducted during 1990.

[a] All indices expressed in number of fish/100 fathom-hours to the nearest full index point.

Table 10. Summary of district sockeye salmon test fishing in the Ugashik District, by index area and date, Bristol Bay, 1990.[a]

Index Area	June		July								
	26	29	1	2	3	6	7	10	13	15	16
Two mi. N. of Cape Grieg		537	120	225	196	622				287	
Cape Grieg	12	71	244	51	489	1,163				210	
Four mi. N. Smoky Pt., Inshore	4	4	267	683	296	579			513	161	
Four mi. N. Smoky Pt., Offshore		409	22	58	320						
Two mi. N. Smoky Pt., Outer Line	21	161								64	
Smoky Pt. Bar N. Side Inshore						538			96	447	
Smoky Pt. Entrance			0	13	13	30	13	281	228	46	
Mid Outer Line		0	141	233	560			116	128		158
Bell Buoy		31	258	64	17						
Four mi. N. Cape Menshikof, Inshore			148	124	716				150		474
Two mi. N. Cape Menshikof, W. line	108	9	132	153	8						17
Three mi. S. South Spit, Inshore	4	4	140	337	1,419	2,186		999	280		1,037
South Spit	13	0	560	300	124	1,144	2,412	800	1,140		1,237
Dago Creek Mouth						32	579				
Pilot Point		5	0	21			1,200	150	45		21
Muddy Point			16	21							
South Channel						51	4	147	23		50
Dog Salmon River		4				84	418	437			191
Bend Below Ugashik		4					79				

[a] All indices expressed in number of fish/100 fathom-hours to the nearest index point.

Table 11. Summary of district sockeye salmon test fishing indices in the Nushagak District, by index area and date, Bristol Bay, 1990.[a]

Index Area	June 22 A.M.	June 23 A.M.	June 24 A.M.	June 25 A.M.	June 26 A.M.	June 27 A.M.	June 27 P.M.	June 28 A.M.	June 28 P.M.	June 29 A.M.
Nushagak River:										
Picnic Point		0	0	0			0	0	0	8,378[c]
Wood River[1]										
A					150			0	393[c]	383[b]
B			425						575[b]	898[b]
Snag Point			0	0			0		41	
Peter Pan							0			0
Grassy Island	54[b]	430	154	0			202[c]	107[b]	2,984	8,290[d]
Nushagak Point		348[b]	590[b]	0	0	0	2,166	0	401[c]	6,948[b]
Nushagak Pt. Offshore								0		
Combine Flats	0	691[b]	617[c]	0	118[c]	921	4,322	1,596[b]	2,747[c]	3,187[c]
Queen Slough		256		0	203[b]	351	754	1,335		0
Clarks Point			2,441		1,964		2,472[c]	0	124[b]	0
Ekuk	159	275	523[b]	0	236[b]	1,286[b]		3,322[b]	0	0
Ekuk Bluff		0	261[c]			0			0	1,650[b]
Ships Ch. N.W.			0	30		80[b]		244[b]		
Middle Ch. N.W.			0	27						
West Ch. N.W.			0					0		
Schooner Ch. N.W.			153[b]	102		0		37		1,036
Dead Man's Spit								0		
Nichols Spit	8									
Igushik (Gravel Spit)	0									
Igushik No. Bank	53[b]									
Igushik So. Bank	227									
Tule Point		0	74[b]	0					3,172[d]	998[b]
Round Sand								60[b]		

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Table 11. (Page 2 of 2)

Index Area	June 29 P.M.	June 30 A.M.	June 30 P.M.	July 2 A.M.	July 4 A.M.	July 5 A.M.	July 5 P.M.	July 6 P.M.
Nushagak River: Picnic Point	1,699[b]	692	385	3126[c]	1557[c]		7200	
Wood River[1]								
A	1,744[b]	243[b]	7,822[c]	5,441[b]	325[c]		1,151[b]	12,422[b]
B	1,397			3,411[b]	483		2,623	
Snag Point								
Peter Pan		143						3,687
Grassy Point	74[b]	438[d]	2,560	15,048[b]	599[d]	862[b]	14,201	
Nushagak Point	120[b]	1,909[b]	1,449	6,885	4,234[c]	726[b]	30,522	16,588
Nushagak Pt. Offshore	0				79[b]	0[b]		
Combine Flats		2,381[c]		12,838	2,186[d]	2,612[b]		
Queen Slough		1,997[b]			145	0	17,152	
Clarks Point	1764[b]			1,480	1,724	113	27,916	
Ekuk	361	1,631[b]			1,408[b]	0[b]		
Ekuk Bluff	0							
Ships Ch. N.W.								
Middle Ch. N.W.								
West Ch. N.W.								
Schooner Ch. N.W.	967[b]							
Deadman's Spit								
Nichols Spit								
Igushik (Gravel Spit)								
Igushik No. Bank								
Igushaik So. Bank								
Tule Point	2,026[b]	11,510[b]	1,576[b]	25,585[b]	953[c]		2,519	
Round Sand								

[1] Wood River: A = Hansen Point (west side of river); B = across from Hansen's Point (east side of river).

[a] All indices expressed in number of fish/100 fathom-hours to the nearest full index point.

[b] Average of two drifts in the same index area.

[c] Average of three drifts in the same index area.

[d] Average of four or more drifts in the same index area.

Table 12. Daily chinook salmon catch per unit of effort in subsistence nets on Dillingham beaches, 1990.

Date[1]	Wind[2] Direction	Knots	Kanakanak Beach CPUE	Kanakanak Beach Effort[3]	Scandanavian Beach CPUE	Scandanavian Beach Effort[3]	Comments:
6/ 8			.07	15	.25	13	+ 9 chums
13	NW	8	0	25	0	14	Rain, blustery NW wind
14	SW	12	0	23	0	14	+ 1 sockeye
14			6+	23	7+	15	Only a few interviewed, likely many more fish caught.
15			4+	23	5+	15	Some nets reportedly had 15-20 chinook each. In addition, several sockeye and chum salmon were caught.
Season Average			2	22	2	14	

[1] Catches recorded at low water when nets are picked.
[2] As recorded on Kanakanak Beach at time of survey.
[3] Total subsistence nets fishing on Kanakanak and Scandanavian Beaches.

Table 13. Emergency order commercial salmon fishing periods, by district, Bristol Bay, 1990.

Emergency Orders							
Number[1]	Date and Time						Hours/Days Open
NAKNEK-KVICHAK DISTRICT							
AKN. 02	June 22	9:00 a.m.	to	June 23	9:00 a.m.		24 hrs
AKN. 04	June 28	5:45 p.m.	to	June 29	3:45 a.m.		10 hrs
AKN. 11	July 03	7:15 a.m.	to	July 03	7:15 p.m.		12 hrs
AKN. CA 02	July 13	8:00 p.m.	to	July 17	9:00 p.m.		97 hrs[2]
AKN. 47	July 27	2:00 p.m.	to	Sept 28			CLOSURE [3]
Naknek Section Only							
AKN. 05	June 30	6:30 a.m.	to	June 30	5:30 p.m.		11 hrs
AKN. 06	July 01	8:30 a.m.	to	July 02	6:30 a.m.		22 hrs
AKN. 09	July 02	9:15 p.m.	to	July 03	7:15 a.m.		10 hrs
AKN. 13	July 04	8:15 a.m.	to	July 04	8:15 p.m.		12 hrs
AKN. 15	July 04	8:15 p.m.	to	July 05	8:15 p.m.		24 hrs
AKN. 17	July 06	10:00 a.m.	to	July 06	10:00 p.m.		12 hrs
AKN. 19	July 06	10:00 p.m.	to	July 07	10:00 p.m.		24 hrs
AKN. 23	July 07	10:00 p.m.	to	July 08	11:00 p.m.		25 hrs
AKN. 26	July 08	11:00 p.m.	to	July 09	11:00 p.m.		24 hrs
AKN. 29	July 10	1:45 p.m.	to	July 11	1:45 p.m.		24 hrs
AKN. 31	July 11	1:45 p.m.	to	July 12	1:45 p.m.		24 hrs
AKN. 36	July 12	1:45 p.m.	to	July 13	3:45 p.m.		26 hrs
AKN. 39	July 13	3:45 p.m.	to	July 17	9:00 a.m.		89.25 hrs
Kvichak Section							
AKN. 08	July 1	8:30 p.m.	to	July 02	6:30 a.m.		10 hrs
AKN. 15	July 05	9:15 a.m.	to	July 05	8:15 p.m.		11 hrs
AKN. 18	July 06	10:00 a.m.	to	July 06	10:00 p.m.		12 hrs[4]
AKN. 21	July 07	11:00 a.m.	to	July 07	10:00 p.m.		11 hrs
AKN. 23	July 07	10:00 p.m.	to	July 08	11:00 a.m.		13 hrs[4]
AKN. 26	July 09	1:30 a.m.	to	July 09	11:30 a.m.		10 hrs
AKN. 27	July 09	11:30 a.m.	to	July 09	11:00 p.m.		11.5 hrs[4]
AKN. 29	July 10	1:45 p.m.	to	July 11	1:45 p.m.		24 hrs[4]
AKN. 32	July 11	1:45 p.m.	to	July 12	1:45 p.m.		24 hrs[4]
AKN. 35	July 12	2:45 a.m.	to	July 12	1:45 p.m.		11 hrs
AKN. 37	July 12	1:45 p.m.	to	July 13	1:45 a.m.		12 hrs
AKN. 38	July 13	1:45 a.m.	to	July 13	3:45 p.m.		14 hrs
AKN. 39	July 13	3:45 p.m.	to	July 14	3:00 a.m.		13.75 hrs
AKN. 41	July 14	3:00 a.m.	to	July 15	3:00 a.m.		24 hrs
AKN. 43	July 15	3:00 a.m.	to	July 17	9:00 a.m.		54 hrs

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Table 13. (Page 2 of 4)

Emergency Orders

Number[1]	Date and Time				Hours/Days Open
EGEGIK DISTRICT					
AKN. 01	June 21	8:30 a.m.	to June 21	6:30 p.m.	10 hrs[5]
AKN. 03	June 28	5:00 p.m.	to June 29	3:00 a.m.	10 hrs
AKN. 07	July 02	6:00 a.m.	to July 02	6:00 p.m.	12 hrs
AKN. 10	July 03	7:00 a.m.	to July 03	7:00 p.m.	12 hrs
AKN. 14	July 04	9:30 p.m.	to July 05	8:30 a.m.	11 hrs
AKN. CA 01	July 04	8:00 p.m.	to July 17	9:00 p.m.	289 hrs[6]
AKN. 16	July 05	10:00 p.m.	to July 06	9:00 p.m.	23 hrs
AKN. 20	July 07	10:30 a.m.	to July 08	10:30 a.m.	24 hrs
AKN. 24	July 08	10:30 a.m.	to July 08	10:30 p.m.	12 hrs
AKN. 28	July 10	12:30 a.m.	to July 10	11:30 p.m.	23 hrs
AKN. 34	July 12	2:00 a.m.	to July 13	1:00 a.m.	23 hrs
AKN. 40	July 14	3:00 a.m.	to July 15	3:00 a.m.	24 hrs
AKN. 44	July 16	5:00 a.m.	to July 17	9:00 a.m.	28 hrs
AKN. 46	July 20	9:00 a.m.	to July 23	9:00 a.m.	72 hrs
AKN. 48	Sept 07	9:00 a.m.	to Sept 30	MIDNIGHT	CLOSURE[7]
UGASHIK DISTRICT					
AKN. 12	July 04	8:00 a.m.	to July 04	8:00 p.m.	12 hrs
AKN. 22	July 08	11:00 a.m.	to July 08	11:00 p.m.	12 hrs
AKN. 25	July 08	11:00 p.m.	to July 09	12:00 noon	13 hrs
AKN. 30	July 10	MIDNIGHT	to July 11	1:00 p.m.	13 hrs
AKN. 33	July 11	1:00 p.m.	to July 12	1:00 a.m.	12 hrs
AKN. 42	July 14	3:00 p.m.	to July 15	3:00 a.m.	12 hrs
AKN. 45	July 17	5:00 a.m.	to July 17	9:00 a.m.	4 hrs
AKN. 46	July 20	9:00 a.m.	to July 23	9:00 a.m.	72 hrs
AKN. 48	Sept 07	9:00 a.m.	to Sept 30	MIDNIGHT	CLOSURE[7]
NUSHAGAK DISTRICT					
DLG. 01	SUBSISTENCE OPENING				23 days[8]
DLG. 03	SUBSISTENCE OPENING				12 hrs[9]
DLG. 04	July 01	8:00 a.m.	to July 01	3:00 p.m.	7 hrs[10]
DLG. 05	July 02	10:30 p.m.	to July 03	5:30 a.m.	7 hrs[10]
DLG. 07	July 06	1:00 a.m.	to July 06	1:00 p.m.	12 hrs
DLG. 08	July 05	MIDNIGHT	to July 06	1:00 p.m.	13 hrs
DLG. 10	July 07	12:30 a.m.	to July 07	12:30 p.m.	12 hrs
DLG. 11	July 07	12:30 p.m.	to July 08	1:30 p.m.	13 hrs

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Table 13. (Page 3 of 4)

Emergency Orders

Number[1]	Date and Time				Hours/Days Open
NUSHAGAK DISTRICT (cont.)					
DLG. 12	July 08	1:30 a.m. to	July 09	2:30 a.m.	25 hrs
DLG. 13	July 09	2:30 a.m. to	July 10	2:30 a.m.	24 hrs
DLG. 14	July 10	2:30 a.m. to	July 12	4:30 a.m.	50 hrs
DLG. 15	July 12	4:30 a.m. to	July 17	9:00 a.m.	124.5 hrs
DLG. CA 01	July 13	8:00 a.m. to	July 17	9:00 a.m.	97 hrs[11]
DLG. 19	July 23	9:00 a.m. to	Sept.30	MIDNIGHT[12]	
DLG. 20	July 23	2:00 p.m. to	July 24	2:00 p.m.	24 hrs
DLG. 21	July 27	4:30 a.m. to	July 27	4:30 p.m.	12 hrs
DLG. 25	SUBSISTENCE OPENING[13]				
Igushik Section Only					
DLG. 06	July 04	10:00 a.m. to	July 04	10:00 p.m.	12 hrs
DLG. 09	July 06	1:00 p.m. to	July 07	1:00 a.m.	12 hrs
TOGIAK DISTRICT					
DLG. 02	June 25	9:00 a.m. to	Sept. 30	MIDNIGHT[14]	
DLG. 16	July 13	9:00 p.m. to	July 14	9:00 p.m.	24 hrs
DLG. 17	July 16	9:00 a.m. to	Sept. 30	MIDNIGHT	CLOSURE[15]
DLG. 22	July 27	7:00 a.m. to	July 27	7:00 p.m.	12 hrs
DLG. 23	July 31	9:00 a.m. to	Aug. 03	9:00 a.m.	72 hrs
DLG. 24	Aug. 07	9:00 a.m. to	Aug. 10	9:00 a.m.	72 hrs
DLG. 26	Aug. 13	9:00 a.m. to	Aug. 15	9:00 a.m.	48 hrs
DLG. 27	Aug. 20	9:00 a.m. to	Sept. 30	MIDNIGHT	CLOSURE[15]
Kulukak, Matogak, Osviak, and Cape Pierce Sections Only					
DLG. 18	July 23	9:00 a.m. to	July 25	9:00 a.m.	48 hrs

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Table 13. (Page 4 of 4)

[1] Prefix code on emergency orders indicate where announcements originated ("AKN" for King Salmon field office and "DLG." for Dillingham field office).
[2] Commissioner's Announcement waives the 48-hour waiting period for relocation of fishing gear and vessels into the Naknek-Kvichak Districts.
[3] Closes the Naknek-Kvichak District at 2:00 p.m., July 27 and reduces the weekly fishing schedule to 4 days per week from 9:00 a.m. Monday to 9:00 a.m. Friday.
[4] Open to setnet fishing only.
[5] Prohibits use of gill net mesh larger than 6.75 inches until 9:00 a.m., July 17, 1990.
[6] Commissioner's Announcement waives the 48-hour waiting period for fishermen transferring districts into Egegik District.
[7] Closes Egegik and Ugashik Districts except under Emergency Order.
[8] Allows Subsistence fishing in the Nushagak Commercial Fishing District, from 9:00 a.m., May 28 until 9:00 a.m., June 20, 1990.
[9] Allows Subsistence fishing in the Nushagak Commercial Fishing District, from 2:00 p.m., June 27 until 2:00 a.m., June 28, 1990.
[10] Prohibits the use of large mesh (King gear).
[11] Commissioner's Announcement waives the 48-hour waiting period for district transfer, change of gear and relocation of set net sites for the Nushagak District.
[12] Eliminates weekly fishing schedule in the Nushagak District, after 9:00 a.m. July 23, 1990, except under Emergency Order.
[13] Allows Subsistence fishing in the Nushagak Commercial Fishing District, from 12:00 noon, August 8 until 12:00 midnight, September 30, 1990.
[14] Reduces weekly fishing schedule in Togiak District to 3 days per week from 9:00 a.m. Monday to 9:00 a.m. Thursday and prohibits the use of large mesh.
[15] Closed to Commercial Fishing until further notice.

Table 14. Daily district registration of drift gill net fishermen by district, Bristol Bay, 1990.[a]

Date	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
6/13	235	240	33	59	43	610
14	272	280	39	59	43	693
15	312	315	45	61	40	773
16	376	322	69	61	41	869
17	317	317	45	61	40	780
18	563	278	68	64	41	1,014
19	808	292	79	55	49	1,283
20	787	340	86	58	52	1,323
21	751	475	91	61	53	1,431
22	697	547	77	68	49	1,438
23	602	596	30	85	48	1,361
24	590	714	26	124	47	1,501
25	600	754	27	173	41	1,595
26	614	734	24	196	37	1,605
27	627	733	23	214	38	1,635
28	653	734	23	222	39	1,671
29	704	706	24	221	37	1,692
30	707	656	36	233	37	1,669
7/01	755	613	48	295	36	1,747
02	792	610	64	278	37	1,781
03	803	605	67	271	39	1,785
04	803	593	93	265	38	1,792
05	804	472	112	247	38	1,673
06	810	590	121	247	38	1,806
07	795	504	142	242	39	1,722
08	789	502	149	245	39	1,724
09	765	473	237	246	37	1,758
10	756	466	275	248	37	1,782
11	732	486	323	243	37	1,821
12	724	500	297	258	37	1,816
13	721	492	302	257	37	1,809
14	735	500	316	260	38	1,849
15	738	492	325	261	40	1,856
Mean	659	513	113	180	41	1,505

[a] Total indicates number of drift gill net permit holders legal to fish each day in the districts (transferees not included). There were 1,863 permit holders actually registered for the season.

Table 15. Commercial salmon catch by date and species, in numbers of fish, Naknek-Kvichak District, Bristol Bay, 1990.

Date	Effort[1] Time	Effort[1] Drift Set	Sockeye	Chinook	Chum	Pink	Coho	Total
6/06	24 hrs.		0	3	0	0	0	3
6/07	24 hrs.		0	8	0	0	0	8
6/08	24 hrs.		0	1	0	0	0	1
6/09	9 hrs.		0	1	0	0	0	1
6/11	15 hrs.		35	19	11	0	0	65
6/12	24 hrs.		244	47	10	0	0	301
6/13	24 hrs.		344	15	28	0	0	387
6/14	24 hrs.		810	97	50	0	0	957
6/15	24 hrs.		1,484	149	71	0	0	1,704
6/16	9 hrs.		1,259	78	92	0	0	1,429
6/18	15 hrs.		15,789	288	601	0	0	16,678
6/19	24 hrs.		19,534	282	688	0	0	20,504
6/20	24 hrs.		25,096	199	954	0	0	26,249
6/21	24 hrs.		53,679	258	1,622	0	1	55,600
6/22[a]	9 hrs.		67,100	213	1,302	0	0	68,615
6/28	6.25 hrs.		72,536	5	524	0	0	73,065
6/29	3.75 hrs.		742,371	52	5,650	0	0	748,073
6/30[b]	11 hrs.		960,844	44	3,556	0	0	964,444
7/01	3.5 hrs.		29,920	0	151	0	0	30,071
7/02[c]	9.25 hrs.		838,159	190	5,387	0	0	843,736
7/03[d]	19.25 hrs.		2,107,281	157	12,464	0	0	2,119,902
7/04[b]	15.75 hrs.		885,168	35	8,436	0	0	893,639
7/05[e]	20.25 hrs.		2,042,522	111	14,633	0	0	2,057,266
7/06[f]	14 hrs.		851,431	29	5,883	0	0	857,343
7/07[g]	24 hrs.		1,091,576	103	19,970	0	0	1,111,649
7/08[h]	24 hrs.		758,625	91	10,087	0	0	768,803
7/09[i]	23 hrs.		1,070,849	78	12,352	0	0	1,083,279
7/10[j]	10.25 hrs.		444,118	34	3,145	0	0	447,297
7/11[k]	24 hrs.		1,229,946	83	10,149	0	0	1,240,178
7/12[l]	24 hrs.		830,781	53	16,516	0	0	847,351
7/13	24 hrs.		513,012	100	27,017	4	0	540,133
7/14	24 hrs.		543,572	69	12,222	0	0	555,863
7/15	24 hrs.		648,605	80	30,580	0	0	679,265

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Table 15. (page 2 of 3)

Date	Effort[1] Time	Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
7/16	24 hrs.			333,826	56	15,835	8	1	349,726
7/17	24 hrs.			321,410	105	21,548	0	0	343,063
7/18	24 hrs.			178,743	65	16,162	4	2	194,976
7/19	24 hrs.			148,908	73	14,963	16	0	163,960
7/20	24 hrs.			122,647	60	18,061	0	1	140,769
7/21	9 hrs.			41,335	29	8,414	17	1	49,796
7/23	15 hrs.			39,218	61	46,788	849	35	86,951
7/24	24 hrs.			36,140	76	24,624	2,200	31	63,071
7/25	24 hrs.			14,958	40	6,272	3,369	63	24,702
7/26	24 hrs.			12,023	30	8,173	4,006	160	24,392
7/27	9 hrs.			6,702	15	3,315	3,681	48	13,761
7/30	15 hrs.			5,407	12	6,497	30,054	580	42,550
7/31	24 hrs.			4,038	12	3,067	24,232	479	31,828
8/01	24 hrs.			2,739	47	2,833	19,301	412	25,332
8/02	24 hrs.			4,451	19	5,173	64,632	672	74,947
8/03	9 hrs.			2,143	5	3,136	51,757	172	57,213
8/06	15 hrs.			1,078	10	2,482	65,873	1,118	70,561
8/07	24 hrs.			1,201	13	3,331	72,978	1,579	79,102
8/08	24 hrs.			963	15	3,560	41,508	1,946	47,992
8/09	24 hrs.			799	17	3,638	34,615	2,270	41,339
8/10	9 hrs.			517	6	1,928	18,477	970	21,898
8/13	15 hrs.			165	2	723	5,153	966	7,009
8/14	24 hrs.			333	7	517	3,458	1,032	5,347
8/15	24 hrs.			138	2	203	1,240	460	2,043
8/16	24 hrs.			15	0	34	129	193	371
8/17	9 hrs.			36	0	27	196	211	470
Total				17,126,625	3,749	425,493	447,757	13,403	18,017,027
% of District Catch				95	0	2	3	0	100

[1] Effort based on aerial surveys and IBM runs.
[a] Weekly period reduced by one day.
[b] Naknek Section only.
[c] Naknek Section open for 2.75 hours.
[d] Naknek Section open for 7.25 hours.
[e] Naknek Section open for 9.25 hours.
[f] Naknek Section open for entire period; Kvichak Section, set gill net only, open for 12 hours.

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Table 15. (page 3 of 3)

[g] Naknek Section open for 24 hours; Kvichak Section, drift gill net only, open for 11 hours; and Kvichak Section, set gill net only, open for 2 hours.
[h] Naknek Section open for entire day; Kvichak section, set gill net only, open for 11 hours.
[i] Naknek Section open for entire period; Kvichak Section, drift gill net only, open for 10 hours; and Kvichak Section, set gill net only, open for 11.5 hours.
[j] Naknek and Kvichak Sections open for set gill net only.
[k] Naknek and Kvichak Sections open for set gill net only.
[l] Naknek and Kvichak Sections, set gill net only, open for entire day; Kvichak Section, drift gill net, open for 21.25 hours.

Table 16. Commercial salmon catch by date and species, in numbers of fish, Egegik District, Bristol Bay, 1990.

Date	Hrs.	Effort[1] Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
6/ 4	15.0			0	2	0	0	0	2
5	24.0			0	1	0	0	0	1
6	24.0			0	6	0	0	0	6
7	24.0			1	3	0	0	0	4
11	15.0			1,141	75	257	0	0	1,473
12	24.0			1,929	79	258	0	0	2,266
13	24.0			2,195	100	269	0	0	2,564
14	24.0			2,679	138	313	0	0	3,130
15	9.0			1,836	64	222	0	0	2,122
18[a]	0.0			175	1	2	0	0	178
19[a]	0.0			324	2	10	0	0	336
20[a]	0.0			904	3	16	0	0	923
21	10.0			69,087	105	1,295	0	0	70,487
22[a]	0.0			245	0	3	0	0	248
23[a]	0.0			607	0	0	0	0	607
24[a]	0.0			6,092	6	53	0	0	6,151
25[a]	0.0			2,793	5	5	0	0	2,803
26[b]	0.0			770	1	2	0	0	773
27[a]	0.0			5,102	0	11	0	0	5,113
28	7.0			37,589	91	266	0	0	37,946
29	3.0			314,741	87	2,255	0	0	317,083
30[a]	0.0			7,872	0	46	0	0	7,918
7/ 1[a]	0.0			5,076	0	23	0	0	5,099
2	12.0	592	262	1,204,893	48	6,936	0	0	1,211,877
3	12.0	589	258	1,114,046	38	7,376	0	0	1,121,460
4	2.5			81,104	1	731	0	0	81,836
5	10.5			793,064	30	4,773	0	0	797,867
6	21.0	490	253	1,205,186	25	6,768	0	0	1,211,979
7	13.5	464	258	424,006	17	2,873	0	0	426,896
8	22.5	376	231	979,918	18	5,994	0	0	985,930
10	23.0			1,174,215	10	15,751	0	0	1,189,976
12	22.0	455	245	1,032,813	14	12,906	0	0	1,045,733
13[b]	1.0			0	0	0	0	0	0
14	21.0	540	246	532,527	6	11,945	0	0	544,478

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Table 16. (Page 2 of 3)

Date	Hrs.	Effort[1] Drift	Effort[1] Set	Sockeye	Chinook	Chum	Pink	Coho	Total
7/15	3.0			94,760	0	3,080	0	0	97,840
16	19.0			294,086	4	9,675	0	0	303,765
17	24.0			191,548	4	6,482	1	0	198,035
18	24.0			148,266	5	2,724	0	0	150,995
19	24.0			132,333	1	2,824	0	0	135,158
20	24.0			56,560	3	1,866	0	0	58,429
21	24.0			42,016	3	1,561	0	1	43,581
22	24.0			28,293	5	6,051	1	3	34,353
23	24.0			23,832	4	2,441	20	11	26,308
24	24.0			21,951	4	1,575	19	8	23,557
25	24.0			13,339	5	763	28	8	14,143
26	24.0			13,429	0	903	20	3	14,355
27	9.0			4,354	1	172	25	1	4,553
30	15.0			4,337	5	342	218	245	5,147
31	24.0			4,118	2	540	434	501	5,595
8/ 1	24.0			2,545	0	452	940	351	4,288
2	24.0			2,281	2	553	1,037	658	4,531
3	9.0			885	1	255	235	366	1,742
6	15.0			1,940	3	732	1,305	1,261	5,241
7	24.0	13	89	833	6	865	1,347	1,268	4,319
8	24.0			543	1	696	580	1,474	3,294
9	24.0			478	1	601	383	2,183	3,646
10	9.0			231	0	207	183	891	1,512
13	15.0			211	1	315	84	2,616	3,227
14	24.0			219	5	447	119	2,670	3,460
15	24.0			196	1	345	52	3,422	4,016
16	24.0			80	1	119	16	1,346	1,562
17	9.0			20	1	25	9	538	593
20	15.0			45	0	77	10	3,013	3,145
21	24.0			80	2	84	31	3,728	3,925
22	24.0			48	1	45	11	3,019	3,124
23	24.0			36	0	4	8	2,938	2,986
24	9.0			18	0	1	1	580	600
27	15.0			19	0	14	4	2,322	2,359
28	24.0	9	51	28	0	12	9	1,883	1,932

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Table 16. (Page 3 of 3)

Date	Hrs.	Effort[1] Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
8/29	24.0			9	0	13	3	1,582	1,607
30	24.0			15	0	6	6	1,097	1,124
31	9.0			4	0	2	2	464	472
9/ 3	15.0			4	0	0	3	1,171	1,178
4	24.0			7	0	0	5	1,065	1,077
5	24.0			9	0	0	0	527	536
6	24.0			17	0	1	0	1,012	1,030
7	9.0			0	0	0	0	49	49
Total				10,086,953	1,048	128,229	7,149	44,275	10,267,654
% of District Catch				98	0	1	0	1	100

[1] Estimated fishing effort based on aerial surveys.
[a] ADF&G test fishing catches.
[b] Catch included in total for July 12.

Table 17. Commercial salmon catch by date and species, in numbers of fish, Ugashik District, Bristol Bay, 1990.

Date	Hrs.	Effort[1] Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
6/ 4	15.0			0	24	0	0	0	24
5	24.0			1	37	0	0	0	38
6	24.0			2	40	1	0	0	43
7	24.0			1	24	0	0	0	25
11	15.0			148	17	0	0	0	165
12	24.0			459	116	26	0	0	601
13	24.0			261	70	14	0	0	345
14	24.0			95	49	8	0	0	152
15	9.0			219	18	12	0	0	249
18	15.0			7,067	259	366	0	0	7,692
19	24.0			11,933	381	702	0	0	13,016
20	24.0	75	12	14,645	316	836	0	0	15,797
21	24.0			3,272	34	219	0	0	3,525
22	9.0			9,955	65	439	0	0	10,459
26[a]	0.0			37	0	6	0	0	43
29[a]	0.0			283	0	24	0	0	307
7/ 2[a]	0.0			1,177	0	16	0	0	1,193
3[a]	0.0			951	0	0	0	0	951
4	12.0	92	57	217,837	45	2,178	0	0	220,060
6[a]	0.0			1,442	0	13	0	0	1,455
7[a]	0.0			1,137	0	9	0	0	1,146
8	13.0	146	70	302,161	31	2,070	0	0	304,262
9	12.0			437,275	9	2,768	0	0	440,052
10[a]	0.0			199	0	0	0	0	199
11	24.0	256	62	356,354	32	3,602	0	6	359,994
12[b]	1.0			0	0	0	0	0	0
13[a]	0.0			1,517	0	0	0	0	1,517
14	9.0	244	69	70,256	7	495	0	0	70,758
15	3.0			192,260	8	2,498	0	0	194,766
16[a]	0.0			1,513	0	21	0	0	1,534
17	19.0	248	73	196,703	7	3,317	0	0	200,027
18	24.0			93,240	16	1,819	0	0	95,075
19	24.0			74,670	19	1,686	0	0	76,375
20	24.0			32,304	9	1,064	0	0	33,377
21	24.0			28,744	4	1,378	0	0	30,126
22	24.0			18,670	2	779	0	0	19,451
23	24.0			12,387	7	1,120	0	0	13,514

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Table 17. (Page 2 of 3)

Date	Hrs.	Effort[1] Drift	Effort[1] Set	Sockeye	Chinook	Chum	Pink	Coho	Total
7/24	24.0			9,540	7	446	0	0	9,993
25	24.0			10,836	3	524	0	0	11,363
26	24.0			5,861	1	227	0	0	6,089
27	9.0			4,196	1	175	0	2	4,374
30	15.0			4,509	1	162	11	34	4,717
31	24.0			4,275	3	358	36	86	4,758
8/ 1	24.0			4,650	10	569	104	111	5,444
2	24.0			3,125	2	245	0	70	3,442
3	9.0			2,197	2	84	0	45	2,328
6	15.0			1,274	0	208	11	215	1,708
7	24.0	5	33	1,287	1	303	14	308	1,913
8	24.0			1,065	0	270	1	368	1,704
9	24.0			395	1	99	25	473	993
10	9.0			194	0	59	1	135	389
13	15.0			283	0	170	16	1,314	1,783
14	24.0			506	3	222	7	1,623	2,361
15	24.0			257	1	82	1	1,807	2,148
16	24.0			189	0	97	0	1,628	1,914
17	9.0			18	0	7	0	183	208
20	15.0			85	0	84	2	2,354	2,525
21	24.0			95	0	98	4	3,244	3,441
22	24.0			64	3	41	0	1,949	2,057
23	24.0			56	1	40	1	2,377	2,475
24	9.0			21	0	9	0	1,668	1,698
27	15.0			13	1	2	0	1,771	1,787
28	24.0	4	24	39	1	1	1	2,113	2,155
29	24.0			14	0	4	0	1,739	1,757
30	24.0			15	0	2	10	2,257	2,284
31	9.0			2	0	0	0	620	622
9/ 3	15.0			18	0	2	1	1,823	1,844
4	24.0	5		4	0	1	8	207	220
5	24.0			7	2	0	0	1,050	1,059
6	24.0			2	0	1	1	140	144
7	9.0			1	0	0	5	11	17

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Table 17. (Page 3 of 3)

Date	Effort[1] Hrs. Drift Set	Sockeye	Chinook	Chum	Pink	Coho	Total
Total		2,144,268	1,690	32,078	260	31,731	2,210,027
% of District Catch		98	0	1	0	1	100

[1] Estimated fishing effort based on aerial surveys.
[a] ADF&G test fishing catches.
[b] Catch included in total for July 11.

Table 18. Commercial salmon catch by date and species, in numbers of fish, Nushagak District, Bristol Bay, 1990.[a]

Date	Time Hrs.	Effort[1] Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
7/ 1	7	278	253	387,936	2,191	64,642	0	0	454,769
2[b]	1.5		253	9,066	47	930	0	0	10,043
3	5.5			145,465	1,378	17,917	0	0	164,760
4[c]	12	265	79	70,932	332	4,030	0	0	75,294
6[d]	24	247	270	526,911	1,191	29,568	3	0	557,673
7	24	242		333,155	1,313	25,655	1	0	360,124
8	24	245		353,464	731	27,724	1	0	381,920
9	24	246		262,382	868	21,085	3	0	284,338
10	24	248		247,582	963	15,935	15	1	264,496
11	24	243		327,504	1,486	19,253	37	1	348,281
12	24	258		214,977	592	15,964	64	5	231,602
13	24	257		121,740	366	10,682	107	1	132,896
14	24	260		102,351	202	6,855	228	0	109,636
15	24	261		58,098	148	5,865	602	0	64,713
16	24			89,126	176	7,110	507	4	96,923
17	24			124,531	403	9,717	627	16	135,294
18	24			70,182	395	6,430	994	2	78,003
19	24			51,512	381	5,311	1,492	55	58,751
20	24			41,035	279	5,417	2,776	248	49,755
21	9			12,727	197	1,420	1,081	33	15,458
23	10	40	85	6,624	234	1,772	8,500	1,533	18,663
24	14			8,410	183	2,237	12,478	1,150	24,458
27	12			3,598	36	933	23,770	4,398	32,735
Total	431			3,569,308	14,092	306,452	53,286	7,447	3,950,585
% of District Catch				90.3	0.4	7.8	1.3	0.2	100.0

[a] Includes fish landed in district test fish project.
[b] Period totaled 7 hrs. and ended at 5:30 am July 3.
[c] Igushik section only.
[d] Includes a 12-hour opening for Nushagak District and an additional 12-hour extension for the Igushik section only.
[1] Effort for July 1 based on aerial survey count; effort for all other days based on district registration.

Table 19. Commercial sockeye salmon catch by date from Clarks Point, Ekuk, and Igushik beaches, Nushagak District, in numbers of fish, Bristol Bay, 1990.

Date	Time	Combine Flats[1]	Queen Slough[2]	Clark's Point Beach[3]	Ekuk Beach[4]	Coffee Point[5]	Igushik Beach[3]	Snake River Beach[7]
7/ 1	7	47,159	13,776	8,895	26,988	10,397	27,963	
2[a]	1.5	490	1,224	0	0	1,682	542	
3	5.5	3,796	2,777	2,527	5,233	1,821	7,859	
4[b]	12						7,382	
6[c]	24	67,859	29,057	16,942	51,804	22,861	45,237	
7	24	18,903	4,810	5,698	15,923	10,073	31,483	
8	24	10,057	1,804	5,940	26,367	5,230	18,262	
9	24	14,371	604	3,514	30,534	1,999	32,271	
10	24	23,813	2,594	4,866	789	1,981	20,111	
11	24	27,835	3,221	4,105	49,049	11,323	22,728	
12	24	16,865	1,282	3,715	16,203	9,933	25,069	
13	24	8,697	2,565	2,100	9,042	4,103	10,985	
14	24	3,058	419	1,562	15,343	1,238	9,829	
15	24	5,536	611	2,096	968	907	2,822	
16	24	1,801	341	1,336	7,327	317	4,606	
17	24	3,707	1,792	3,239	17,572	740	5,764	142
18	24	3,077	936	1,546	12,051	217	5,859	0
19	24	1,857	791	832	10,837	832	4,397	0
20	24	2,279	1,037	1,106	11,813	916	2,184	0
21	9	2,225	386	935	3,137	1,960	541	0
23	10	1,941	1,371	22	748	976	117	0
24	14	727	1,487	114	1,157	1,402	453	0
27	12	794	740	145	628	387	0	0
Total		266,847	73,625	71,235	313,513	91,296	286,464	142

[1] Sockeye salmon accounted for 92% of the total beach catch. Other species landed included 2,663 Chinook; 6,852 Chums; 14,929 Pinks; and 77 Cohos.

[2] Sockeye salmon accounted for 89% of the total beach catch. Other species landed included 179 Chinook; 4,769 Chums; 4,223 Pinks; and 175 Cohos.

[3] Sockeye salmon accounted for 94% of the total beach catch. Other species landed included 157 Chinook; 3,741 Chums; 689 Pinks; and 24 Cohos.

[4] Sockeye salmon accounted for 95% of the total beach catch. Other species landed included 368 Chinook; 9,860 Chums; 4,283 Pinks; and 386 Cohos.

[5] Sockeye salmon accounted for 90% of the total beach catch. Other species landed included 1,154 Chinook; 2,493 Chums; 6,631 Pinks; and 403 Cohos.

[6] Sockeye salmon accounted for 99% of the total beach catch. Other species landed included 685 Chinook; 326 Chums; 2 PInks; and 0 Cohos.

[7] Sockeye salmon accounted for 100% of the total beach catch.

Table 20. Commercial salmon catch by date and species, in numbers of fish, Togiak District, Bristol Bay, 1990.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/11	176	35	65	0	0	276
12	487	126	204	0	0	817
13	223	127	81	0	0	431
14	169	230	126	0	0	525
15	59	277	142	0	0	478
16	44	2	110	0	0	156
18	944	440	1,025	0	0	2,409
19	1,551	807	1,710	0	0	4,068
20	1,577	570	1,964	0	0	4,111
21	1,268	611	1,860	1	0	3,740
22	920	415	1,208	0	0	2,543
23	20	0	0	0	0	20
25	3,654	1,173	2,803	3	0	7,633
26	6,073	1,037	6,364	6	0	13,480
27	4,643	699	4,566	8	0	9,916
28	2,428	198	1,657	2	0	4,285
7/02	14,481	1,127	4,099	8	0	19,715
03	16,321	899	6,944	7	0	24,171
04	14,904	691	9,217	11	0	24,823
05	7,504	431	5,775	5	0	13,715
09	16,521	396	4,923	13	0	21,853
10	30,009	585	15,030	19	0	45,643
11	25,377	465	12,280	24	0	38,146
12	9,938	175	5,303	8	0	15,424
13	1,286	15	209	1	0	1,511
14	30,639	482	9,689	55	0	40,865
23	2,473	8	1,253	81	0	3,815
24	4,706	24	1,712	293	0	6,735
25	1,768	10	447	120	0	2,345
27	11,135	26	4,179	1,363	0	16,703
31	4,498	13	1,322	1,068	8	6,909
8/01	7,066	49	3,332	2,680	46	13,173
02	4,099	28	2,147	1,303	49	7,626
03	2,174	10	812	457	8	3,461
07	962	5	529	166	48	1,710

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Table 20. (Page 2 of 2)

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
08	2,353	12	1,332	524	226	4,447
09	1,871	19	592	344	244	3,070
10	870	5	194	92	125	1,286
13	893	6	182	188	612	1,881
14	977	6	228	110	727	2,048
15	438	7	96	54	626	1,221
Total	237,499	12,241	115,711	9,014	2,719	377,184
% of District Catch	63.0	3.2	30.7	2.4	0.7	100.0

[1] See Table 13 for inseason adjustments to the regular weekly fishing schedule.

Table 21. Commercial salmon catch by date and species, in numbers of fish, Togiak Section, Bristol Bay, 1990.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/11	10	3	3	0	0	16
12	73	60	23	0	0	156
13	57	62	22	0	0	141
14	51	67	29	0	0	147
15	45	82	68	0	0	195
						0
18	418	353	375	0	0	1,146
19	800	680	896	0	0	2,376
20	672	462	761	0	0	1,895
21	939	498	1,269	1	0	2,707
22	686	374	838	0	0	1,898
						0
25	2,650	1,117	2,176	3	0	5,946
26	4,396	918	5,044	4	0	10,362
27	3,131	632	3,455	8	0	7,226
28	1,324	121	764	2	0	2,211
7/02	11,986	1,050	3,666	8	0	16,710
						0
03	11,789	816	6,004	7	0	18,616
04	10,333	612	7,249	11	0	18,205
05	5,806	391	4,720	5	0	10,922
09	13,541	359	3,996	13	0	17,909
10	24,151	539	13,102	19	0	37,811
						0
11	20,852	436	11,055	21	0	32,364
12	6,566	159	4,253	8	0	10,986
13	1,286	15	209	1	0	1,511
14	27,589	438	8,969	55	0	37,051
27	11,135	26	4,179	1,363	0	16,703
						0
31	3,765	10	1,220	903	8	5,906
8/01	6,664	46	3,087	2,500	37	12,334
02	3,629	27	1,897	1,128	35	6,716
03	2,073	10	785	425	8	3,301
07	894	5	521	160	47	1,627
						0
08	2,195	12	1,318	504	214	4,243
09	1,717	16	557	313	222	2,825
10	852	5	192	87	116	1,252
13	893	6	182	188	612	1,881
14	915	5	211	105	606	1,842

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Table 21. (Page 2 of 2)

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
8/15	402	6	85	51	391	935
Total	184,285	10,418	93,180	7,893	2,296	298,072
% of Section Total	61.8	3.5	31.3	2.6	0.8	100.0

[1] Togiak River Section open four days per week. See Table 13 for inseason adjustments to the weekly fishing schedule.

Table 22. Commercial salmon catch by date and species, in numbers of fish, Kulukak Section, Bristol Bay, 1990.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/11	165	3	35	0	0	203
12	411	13	133	0	0	557
13	161	0	15	0	0	176
14	118	12	42	0	0	172
18	456	38	278	0	0	772
19	574	44	433	0	0	1,051
20	719	45	825	0	0	1,589
21	275	28	373	0	0	676
25	1,004	56	627	0	0	1,687
26	1,677	119	1,320	2	0	3,118
27	1,512	67	1,111	0	0	2,690
28	984	64	764	0	0	1,812
7/02	2,495	77	433	0	0	3,005
03	4,532	83	940	0	0	5,555
04	4,425	76	1,816	0	0	6,317
05	1,698	40	1,055	0	0	2,793
09	2,980	37	927	0	0	3,944
10	5,858	46	1,928	0	0	7,832
11	4,525	29	1,225	3	0	5,782
12	3,372	16	1,050	0	0	4,438
14	3,050	44	720	0	0	3,814
23	38	4	630	0	0	672
24	112	4	534	0	0	650
25	396	3	109	8	0	516
8/01	44	2	176	19	4	245
02	117	0	126	21	0	264
Total	41,698	950	17,625	53	4	60,330
% of Section Total	69.1	1.6	29.2	0.1	0.0	100.0

[1] Kulukak Section open three days per week. See Table 13 for inseason adjustments to the weekly fishing schedule.

Table 23. Commercial salmon catch by date and species, in numbers of fish, Matogak Section, Bristol Bay, 1990.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/12	0	1	7	0	0	8
16	4	1	27	0	0	32
19	60	4	80	0	0	144
20	17	2	1	0	0	20
22	215	25	183	0	0	42
23	20	0	0	0	0	20
28	120	13	129	0	0	262
23	2,435	4	623	81	0	3,143
24	3,378	14	853	218	0	4,463
25	1,307	6	306	85	0	1,704
31	733	3	102	165	0	1,003
8/01	358	1	69	161	5	594
02	335	1	113	134	4	587
03	46	0	2	20	0	68
07	68	0	8	6	1	83
08	158	0	14	20	12	204
09	154	3	35	31	22	245
14	62	1	17	5	121	206
15	36	1	11	3	235	286
Total	9,506	80	2,580	929	400	13,495
% of Section Total	70.4	0.6	19.1	6.9	3.0	100.0

[1] Matogak Section open five days per week. See Table 13 for inseason adjustments to the weekly fishing schedule.

Table 24. Commercial salmon catch by date and species, in numbers of fish, Osviak Section, Bristol Bay, 1990.

Date[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
6/11	1	29	27	0	0	57
12	3	52	41	0	0	96
13	5	65	44	0	0	114
14	6	157	57	0	0	220
15	8	189	72	0	0	269
16	40	1	83	0	0	124
18	70	49	372	0	0	491
19	117	79	301	0	0	497
20	169	61	377	0	0	607
21	54	85	218	0	0	357
22	19	16	187	0	0	222
7/04	146	3	152	0	0	301
24	1,216	6	325	75	0	1,622
25	65	1	32	27	0	125
8/02	18	0	11	20	10	59
03	55	0	25	12	0	92
10	18	0	2	5	9	34
Total	2,010	793	2,326	139	19	5,287
% of Section Total	38.0	15.0	44.0	2.6	0.4	100.0

[1] Osviak Section open five days per week. See Table 13 for inseason adjustments to the weekly fishing schedule.

Table 25. Commercial salmon catch by district and species, in numbers of fish, Bristol Bay, 1990.[a]

District and River System	Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT						
Kvichak River	10,468,631					
Branch River	381,911					
Naknek River	6,276,083					
Total	17,126,625	3,749	425,493	447,757	13,403	18,017,027
EGEGIK DISTRICT	10,086,953	1,048	128,229	7,149	44,275	10,267,654
UGASHIK DISTRICT	2,144,268	1,690	32,078	260	31,731	2,210,027
NUSHAGAK DISTRICT						
Wood River	1,577,328					
Igushik River	901,557					
Nushagak-Mulchatna	1,090,423					
Total	3,569,308	14,092	306,452	53,286	7,447	3,950,585
TOGIAK DISTRICT						
Togiak Section	184,285	10,418	93,180	7,893	2,296	298,072
Kulukak Section	41,698	950	17,625	53	4	60,330
Matogak Section	9,506	80	2,580	929	400	13,495
Osviak Section	2,010	793	2,326	139	19	5,287
Total	237,499	12,241	115,711	9,014	2,719	377,184
TOTAL BRISTOL BAY	33,164,653	32,820	1,007,963	517,466	99,575	34,822,477
SPECIES PERCENT	95.2	0.1	2.9	1.5	0.3	100

[a] Apportionment of the inshore sockeye salmon catch by river system to the Naknek-Kvichak and Nushagak Districts is preliminary.

Table 26. Daily sockeye salmon escapement tower counts by river system, Bristol Bay, 1990.

	Kvichak River		Naknek River		Egegik River		Ugashik River		Wood River		Igushik River		Togiak River	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/20									72	72				
21					60	60			6	78				
22			1,158	1,158	24	84			1,770	1,848	6	6		
23			6,126	7,284	0	84			1,554	3,402	714	720		
24	0	0	2,190	9,474	642	726			1,032	4,434	942	1,662		
25	942	942	3,762	13,236	1,194	1,920			198	4,632	636	2,298		
26	1,110	2,052	69,396	82,632	1,218	3,138			366	4,998	2,478	4,776		
27	1,350	3,402	17,496	100,128	720	3,858			186	5,184	4,290	9,066		
28	2,232	5,634	27,606	127,734	5,142	9,000			702	5,886	3,684	12,750		
29	2,694	8,328	146,736	274,470	14,832	23,832			1,590	7,476	2,580	15,330		
30	31,104	39,432	146,694	421,164	27,126	50,958			5,976	13,452	2,196	17,526		
7/ 1	6,228	45,660	137,100	558,264	41,208	92,166			24,336	37,788	3,072	20,598		
2	173,064	218,724	285,234	843,498	261,582	353,748			81,840	119,628	6,726	27,324		
3	606,654	825,378	75,528	919,026	334,050	687,798	474	474	102,726	222,354	10,572	37,896	84	84
4	586,980	1,412,358	158,478	1,077,504	349,668	1,037,466	774	1,248	50,046	272,400	32,418	70,314	1,062	1,146
5	461,508	1,873,866	108,486	1,185,990	138,978	1,176,444	1,404	2,652	11,544	283,944	42,786	113,100	2,142	3,288
6	525,504	2,399,370	174,054	1,360,044	137,634	1,314,078	2,484	5,136	131,622	415,566	37,356	150,456	852	4,140
7	502,110	2,901,480	113,286	1,473,330	73,416	1,387,494	816	5,952	361,104	776,670	28,176	178,632	516	4,656
8	607,410	3,508,890	45,426	1,518,756	51,636	1,439,130	11,316	17,268	126,630	903,300	39,876	218,508	1,206	5,862
9	552,180	4,061,070	34,362	1,553,118	28,644	1,467,774	21,192	38,460	23,898	927,198	31,944	250,452	1,950	7,812
10	630,690	4,691,760	58,086	1,611,204	68,520	1,536,294	28,512	66,972	25,830	953,028	31,536	281,988	2,220	10,032
11	389,130	5,080,890	91,866	1,703,070	58,986	1,595,280	52,932	119,904	21,732	974,760	13,140	295,128	4,344	14,376
12	307,350	5,388,240	79,524	1,782,594	142,782	1,738,062	88,320	208,224	29,628	1,004,388	16,434	311,562	4,770	19,146
13	414,600	5,802,840	54,324	1,836,918	119,226	1,857,288	119,148	327,372	26,508	1,030,896	13,764	325,326	5,424	24,570
14	405,150	6,207,990	34,152	1,871,070	76,122	1,933,410	98,910	426,282	13,326	1,044,222	7,416	332,742	3,384	27,954
15	210,108	6,418,098	26,304	1,897,374	52,758	1,986,168	55,200	481,482	7,650	1,051,872	6,222	338,964	1,392	29,346
16	91,980	6,510,078	38,646	1,936,020	118,032	2,104,200	51,414	532,896	9,042	1,060,914	7,620	346,584	3,414	32,760
17	93,360	6,603,438	36,678	1,972,698	23,718	2,127,918	32,592	565,488	3,486	1,064,400	4,200	350,784	4,164	36,924
18	70,434	6,673,872	22,470	1,995,168	13,254	2,141,172	57,162	622,650	2,298	1,066,698	4,170	354,954	5,328	42,252
19	58,692	6,732,564	17,280	2,012,448	13,890	2,155,062	29,988	652,638	1,740	1,068,438	3,936	358,890	4,122	46,374

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Table 26. (Page 2 of 2)

Date	Kvichak River		Naknek River		Egegik River		Ugashik River		Wood River		Igushik River		Togiak River	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
20	48,510	6,781,074	20,934	2,033,382	15,612	2,170,674	15,666	668,304	1,002	1,069,440	2,910	361,800	5,118	51,492
21	46,056	6,827,130	17,010	2,050,392	5,874	2,176,548	13,992	682,296			2,292	364,092	4,728	56,220
22	48,876	6,876,006	14,064	2,064,456	5,034	2,181,582	7,428	689,724			1,284	365,376	4,998	61,218
23	38,748	6,914,754	18,636	2,083,092	4,056	2,185,638	2,604	692,328			474	365,850	5,244	66,462
24	26,706	6,941,460	9,486	2,092,578	3,852	2,189,490	4,470	696,798					4,824	71,286
25	28,560	6,970,020			1,872	2,191,362	3,018	699,816					9,414	80,700
26							3,438	703,254					6,660	87,360
27							7,104	710,358					2,832	90,192
28							9,870	720,228					4,284	94,476
29							9,810	730,038					6,282	100,758
30													3,642	104,400
31													3,708	108,108
8/ 1													3,702	111,810
2													5,370	117,180
3													5,136	122,316
4													4,056	126,372
5													2,118	128,490
6													3,084	131,574
7													2,046	133,620
8													1,620	135,240
9													2,904	138,144
Total		6,970,020		2,092,578		2,191,362		730,038[a]		1,069,440		365,850		141,977[b]

[a] Another 8,100 and 11,340 sockeye were observed spawning in Dog Salmon and King Salmon River tributaries, respectively, bringing the Ugashik District sockeye escapment total to 749,478 fish.

[b] Due to the late run timing in 1990, a post season adjustment was made for escapement after 8/9.

Table 27. Daily salmon escapement into the Nushagak River, by species, as estimated by hydroacoustic equipment, 1990.

	Chinook		Sockeye		Chum		Pink		Coho	
Date	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/ 6	63	63	11	11	35	35	0	0	0	0
7	64	127	11	22	36	71	0	0	0	0
8	136	263	32	54	88	159	0	0	0	0
9	386	649	145	199	322	481	0	0	0	0
10	151	800	33	232	94	575	0	0	0	0
11	108	908	23	255	66	641	0	0	0	0
12	94	1,002	15	270	51	692	0	0	0	0
13	241	1,243	52	322	149	841	0	0	0	0
14	166	1,409	37	359	104	945	0	0	0	0
15	2,468	3,877	149	508	2,191	3,136	0	0	0	0
16	1,953	5,830	117	625	1,691	4,827	0	0	0	0
17	844	6,674	51	676	747	5,574	0	0	0	0
18	712	7,386	43	719	618	6,192	0	0	0	0
19	788	8,174	47	766	665	6,857	0	0	0	0
20	542	8,716	0	766	1,627	8,484	0	0	0	0
21	1,374	10,090	0	766	4,766	13,250	0	0	0	0
22	10,709	20,799	995	1,761	61,168	74,418	0	0	0	0
23	4,692	25,491	5,297	7,058	13,549	87,967	0	0	0	0
24	1,729	27,220	1,960	9,018	5,180	93,147	0	0	0	0
25	890	28,110	1,009	10,027	2,668	95,815	0	0	0	0
26	285	28,395	320	10,347	787	96,602	0	0	0	0
27	313	28,708	355	10,702	942	97,544	0	0	0	0
28	264	28,972	1,540	12,242	152	97,696	0	0	0	0
29	332	29,304	1,935	14,177	190	97,886	0	0	0	0
30	283	29,587	1,604	15,781	137	98,023	0	0	0	0
7/ 1	1,428	31,015	9,858	25,639	37,878	135,901	0	0	0	0
2	5,317	36,332	85,624	111,263	28,403	164,304	0	0	0	0
3	2,350	38,682	55,341	166,604	23,937	188,241	0	0	0	0
4	1,857	40,539	23,207	189,811	6,148	194,389	0	0	0	0
5	724	41,263	8,977	198,788	2,364	196,753	0	0	0	0
6	1,171	42,434	34,852	233,640	19,729	216,482	0	0	0	0
7	2,579	45,013	314,041	547,681	19,224	235,706	0	0	0	0
8	10,211	55,224	56,812	604,493	28,154	263,860	0	0	0	0
9	2,301	57,525	10,124	614,617	6,448	270,308	0	0	0	0
10	1,636	59,161	4,864	619,481	10,333	280,641	0	0	0	0
11	433	59,594	2,752	622,233	3,337	283,978	0	0	0	0
12	643	60,237	7,528	629,761	2,854	286,832	0	0	0	0
13	619	60,856	6,579	636,340	2,472	289,304	0	0	0	0
14	447	61,303	3,799	640,139	1,035	290,339	179	179	0	0
15	179	61,482	3,165	643,304	564	290,903	72	251	0	0
16	157	61,639	2,129	645,433	436	291,339	63	314	0	0
17	281	61,920	1,953	647,386	612	291,951	112	426	0	0
18	243	62,163	1,319	648,705	496	292,447	97	523	0	0
19	25	62,188	845	649,550	651	293,098	106	629	25	25
20	30	62,218	883	650,433	702	293,800	110	739	30	55
21	51	62,269	1,206	651,639	1,011	294,811	151	890	51	106
22	114	62,383	2,785	654,424	2,313	297,124	348	1,238	114	220
23	127	62,510	3,579	658,003	2,872	299,996	447	1,685	127	347
24	131	62,641	3,278	661,281	2,703	302,699	410	2,095	131	478
25	364	63,005	483	661,764	2,641	305,340	665	2,760	432	910

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Table 27. (Page 2 of 2)

Date	Chinook		Sockeye		Chum		Pink		Coho	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
26	208	63,213	572	662,336	2,495	307,835	676	3,436	494	1,404
27	94	63,307	600	662,936	2,265	310,100	647	4,083	508	1,912
28	531	63,838	788	663,724	4,130	314,230	1,053	5,136	701	2,613
29	37	63,875	1,204	664,928	601	314,831	17,893	23,029	960	3,573
30	22	63,897	1,220	666,148	525	315,356	17,770	40,799	991	4,564
31	12	63,909	763	666,911	318	315,674	11,070	51,869	621	5,185
8/ 1	0	63,909	130	667,041	447	316,121	32,017	83,886	2,574	7,759
2	46	63,955	138	667,179	46	316,167	39,470	123,356	3,238	10,997
3	0	63,955	735	667,914	269	316,436	64,515	187,871	1,033	12,030
4	0	63,955	188	668,102	557	316,993	86,613	274,484	3,068	15,098
5	0	63,955	1,175	669,277	828	317,821	193,407	467,891	2,701	17,799
6	0	63,955	2,993	672,270	3,290	321,111	90,081	557,972	7,695	25,494
7	0	63,955	1,788	674,058	1,863	322,974	76,456	634,428	8,062	33,556
8	0	63,955	5,030	679,088	5,102	328,076	88,089	722,517	11,915	45,471
9	0	63,955	867	679,955	896	328,972	38,446	760,963	2,513	47,984
10	0	63,955	0	679,955	0	328,972	9,279	770,242	8,305	56,289
11	0	63,955	0	679,955	0	328,972	11,861	782,103	10,354	66,643
12	0	63,955	0	679,955	0	328,972	9,429	791,532	8,011	74,654
13	0	63,955	236	680,191	297	329,269	2,350	793,882	21,355	96,009
14	0	63,955	177	680,368	199	329,468	1,257	795,139	13,331	109,340
15	0	63,955	0	680,368	47	329,515	555	795,694	5,943	115,283
16	0	63,955	0	680,368	16	329,531	178	795,872	2,382	117,665
17	0	63,955	0	680,368	97	329,628	405	796,277	6,794	124,459
18	0	63,955	0	680,368	97	329,725	580	796,857	7,238	131,697
19	0	63,955	0	680,368	68	329,793	232	797,089	3,450	135,147
20	0	63,955	0	680,368	0	329,793	442	797,531	2,063	137,210
21	0	63,955	0	680,368	0	329,793	353	797,884	1,301	138,511
22	0	63,955	0	680,368	0	329,793	297	798,181	1,078	139,589
23	0	63,955	0	680,368	0	329,793	1,137	799,318	864	140,453
24	0	63,955	0	680,368	0	329,793	587	799,905	694	141,147
25	0	63,955	0	680,368	0	329,793	462	800,367	557	141,704
26	0	63,955	0	680,368	0	329,793	802	801,169	808	142,512
27	0	63,955	0	680,368	0	329,793	289	801,458	2,801	145,313
28	0	63,955	0	680,368	0	329,793	148	801,606	2,130	147,443
29	0	63,955	0	680,368	0	329,793	119	801,725	1,662	149,105
30	0	63,955	0	680,368	0	329,793	0	801,725	1,458	150,563
31	0	63,955	0	680,368	0	329,793	0	801,725	848	151,411
9/ 1	0	63,955	0	680,368	0	329,793	0	801,725	722	152,133
2	0	63,955	0	680,368	0	329,793	0	801,725	484	152,617
3	0	63,955	0	680,368	0	329,793	0	801,725	602	153,219
4	0	63,955	0	680,368	0	329,793	0	801,725	1,011	154,230
5	0	63,955	0	680,368	0	329,793	0	801,725	831	155,061
6	0	63,955	0	680,368	0	329,793	0	801,725	1,064	156,125
7	0	63,955	0	680,368	0	329,793	0	801,725	1,283	157,408
8	0	63,955	0	680,368	0	329,793	0	801,725	984	158,392
9	0	63,955	0	680,368	0	329,793	0	801,725	1,289	159,681
10	0	63,955	0	680,368	0	329,793	0	801,725	1,373	161,054
11	0	63,955	0	680,368	0	329,793	0	801,725	1,512	162,566
12	0	63,955	0	680,368	0	329,793	0	801,725	287	162,853

Table 28. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey and river test fishing enumeration methods, in thousands of fish, Kvichak River, Bristol Bay, 1990.

	Tower Count		Aerial Survey				River Test Fishing			
			Nakeen to		Index to		Fish Per	Index Points		Cumulative
Date	Daily	Cum.	Index	Index	Tower	Total	Index Pt.[1]	Daily	Cum.	Escapement
6/20								0	0	0
21							113	19	19	2
22							113	0	19	2
23							113	21	41	5
24	0	0					113	8	49	6
25	1	1					113	0	49	6
26	1	2					113	0	49	6
27	1	3					113	469	518	59
28	2	6	20	7	1	29	113	612	1,130	128
29	3	8	28	7	3	37	113	446	1,576	178
30	31	39					113	1,667	3,244	367
7/ 1	6	46	71	343	37	451[a]	113	5,969	9,212	1,041
2	173	219	577	524	91	1,192	113	5,692	14,904	1,684
3	607	825	286	436	278	1,000	113	3,781	18,685	2,008
4	587	1,412	180	214	200	594	96	2,011	19,782	1,904
5	462	1,874	174	201	134	509	127	2,948	22,281	2,835
6	526	2,399	271	248	169	688	136	3,048	25,330	3,452
7	502	2,901	234	273	204	711	151	4,106	29,436	4,451
8	607	3,509	263	213	241	717	147	2,216	31,651	4,683
9	552	4,061	130	137	177	445[a]	149	1,834	33,485	4,994
10	631	4,692	112	71	225	408	148	2,092	35,578	5,274
11	389	5,081	130	37	118	285	151	3,423	39,000	5,918
12	307	5,388	232	246	131	609	160	1,291	40,293	6,483
13	415	5,803	79	39	139	257	163	514	40,805	6,656
14	405	6,208					159	756	41,562	6,616
15	210	6,418					159	514	42,076	6,702
16	92	6,510								
17	93	6,603								
18	70	6,674								
19	59	6,733								
20	49	6,781								
21	46	6,827								
22	49	6,876								
23	39	6,915								
24	27	6,941								
25	29	6,970								
Total		6,970					117		59,359	8,148

[1] Fish per index point was based on lag time and/or catchability factors.
[a] Poor survey conditions.

Table 29. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods, in thousands of fish, Egegik River, Bristol Bay, 1990.

	Tower Count		Aerial Survey		River Test Fishing			
						Index Points		Cumulative
Date	Daily	Cum.	Lagoon	Total	Fish per Index Pt.[1]	Daily	Cum.	Escapement
6/12					59	0	0	0
13					59	0	0	0
14					59	0	0	0
15					59	0	0	0
16					59	10	10	1
17					59	0	10	1
18					59	37	47	3
19					59	84	131	8
20			1	1	59	96	227	13
21	0	0			59	47	274	16
22	0	0			59	14	288	17
23	0	0	1	1	59	157	445	26
24	1	1			59	108	553	33
25	1	2			59	454	1,007	59
26	1	3	8	8	59	174	1,181	70
27	1	4			59	232	1,413	83
28	5	9	16	16	59	375	1,788	105
29	15	23			59	61	1,849	109
30	27	50	9	9	59	1,209	3,058	180
7/1	41	92	74	188	43	4,277	7,335	315
2	262	354	65	285	65	3,103	10,438	678
3	334	688	89	219	93	383	10,821	1,006
4	350	1,037			99	566	11,387	1,127
5	139	1,176			108	1,515	12,902	1,393
6	138	1,314	38	68	108	301	13,203	1,426
7	73	1,387			107	287	13,490	1,443
8	52	1,439			109	69	13,559	1,478
9	29	1,468			108	274	13,833	1,494
10	69	1,536			113	1,689	15,522	1,754
11	59	1,595			115	693	16,215	1,865
12	143	1,738	19	19	111	912	17,127	1,901
13	119	1,857			114	141	17,268	1,969
14	76	1,933	8	8	112	372	17,640	1,976
15	53	1,986			115	453	18,093	2,081
16	118	2,104			119	208	18,301	2,178
17	24	2,128						
18	13	2,141						
19	14	2,155						
20	16	2,171						
21	6	2,177						
22	5	2,182						
23	4	2,186						
24	4	2,189						
25	2	2,191						
Total		2,191			120		18,301	2,178

[1] The 1985-89 mean fish per index point relationship was used until June 30 when lag-time relationships proved more accurate.

Table 30. Comparison of daily sockeye salmon escapement estimates by tower count, aerial survey, and river test fishing enumeration methods, in thousands of fish, Ugashik River, Bristol Bay, 1990.

	Tower Count		Aerial Survey		River Test Fishing			
						Index Points		
Date	Daily	Cum.	Lagoon	Total	Fish per Index Pt.[1]	Daily	Cum.	Cumulative Escapement
6/20			0	0	37	0	0	0
21					37	0	0	0
22					37	0	0	0
23					37	24	24	1
24					37	13	37	1
25					37	14	51	2
26			0	0	37	14	65	2
27					37	24	89	3
28					37	10	99	4
29					37	5	104	4
30					37	5	109	4
7/ 1					37	5	114	4
2					37	33	147	5
3	0	0	0	0	37	53	200	7
4	1	1			37	69	269	10
5	1	2			37	198	467	17
6	2	4	0	0	37	582	1,049	39
7	1	5			37	958	2,007	74
8	11	16	3	3	37	1,301	3,308	122
9	21	37	3	3	37	3,298	6,606	244
10	29	66			37	1,842	8,448	313
11	53	120	1	2	36	2,884	11,332	408
12	88	208	19	25	37	2,041	13,373	495
13	119	327	13	15	38	1,231	14,604	555
14	99	426	2	3	37	1,030	15,634	578
15	55	481	2	3	36	752	16,386	590
16	51	532			36	897	17,283	622
17	33	565	0	1	36	1,338	18,621	670
18	57	622			38	726	19,347	735
19	30	652			37	327	19,674	728
20	16	668			35	440	20,114	704
21	14	682						
22	7	689						
23	3	692						
24	4	696						
25	3	700						
26	3	703						
27	7	710						
28	10	720						
29	9	730						
Total		730			36		20,114	704

[1] The 1985-89 mean fish per index point relationship was used until July 11 when lag-time relationships proved more accurate.

Table 31. Inseason comparison of ocean age composition of sockeye salmon escapement using length frequency and scale analysis methods, Wood River, Bristol Bay, 1990.

Date	2-Ocean (%)		3-Ocean (%)		LF Sample Size	Scale Sample Size[1]
	Length Frequency	Scales	Length Frequency	Scales		
7/ 2	62	52	37	47	215	172
3	62	54	38	45	271	218
4	70	50	29	49	197	169
6	53	37	46	63	212	186
7	51	32	48	68	343	280
8	77	52	23	48	228	191
9	73	64	27	36	119	90
10	68	66	32	34	50	44
11	82	72	18	28	55	39
12	70	57	30	40	40	35
13	82	77	18	23	84	71
14	88	88	12	12	56	43
FINAL	70	58	30	41	1,870	1,538
ADF&G FORECAST		46		54		

[1] Actual number of readable scales.

Table 32. Comparison of daily sockeye salmon escapement estimates by tower count and aerial survey enumeration methods, in thousands of fish, Wood River, Bristol Bay, 1990.

	Tower Count		Aerial Survey[1]	
Date	Daily	Cum.	Number	Comments
6/21	+	+		
22	2	2	+	Good conditions, but only 12 fish sighted.
23	2	3	+	Less than 100. Lots of beluga off mouth.
24	1	4		
25	+	5		
26	+	5		
27	+	5		
28	1	6		
29	2	7		
30	6	13	+	Only 200 visible. Heavy beluga at mouth.
7/ 1	24	38	3[a]	Jumpers below Muklung River, but not heavy.
2	82	120	21	Hundreds of beluga off the mouth.
3	103	222	8	Heavy fog in am. Fish all at top in pm.
4	50	272	3	Fog in am. Low water survey poor vis. pm.
5	12	284		
6	132	416	59	Heavy sign but no showing in am. Pm visible.
7	361	777	50	Heavy both banks. Lots of sign below too.
8	127	903		
9	24	927		
10	26	953		
11	22	975		
12	30	1,004		
13	27	1,031		
14	13	1,044		
15	8	1,052		
16	9	1,061		
17	3	1,064		
18	2	1,067		
19	2	1,068		
20	1	1,069		
Total		1,069		

[1] Estimated number of fish in clear water index areas immediately below the counting tower at the time of the survey.

[a] Average of two aerial surveys.

Table 33. Comparison of daily sockeye salmon escapement estimates by tower count and aerial survey enumeration methods, in thousands of fish, Igushik River, Bristol Bay, 1990.

	Tower Count		Aerial Survey[1]			
Date	Daily	Cum.	Lagoon	River	Total	Comments
6/22	+	+	0	+	+	50 fish in upper lagoon.
23	1	1	+	+	+	A few in all 3 areas.
24	1	2	+	+	+	100+ in upper areas only.
25	1	2				
26	2	5	0	+	+	300+ all in upper river.
27	4	9	+	1	1	Few in lower section.
28	4	13	+	+	+	Scant few in all 3 areas.
29	3	15	0	+	+	Lagoon empty.
30	2	18				
7/ 1	3	21				
2	7	27	1	2	3	Most at top, all improved.
3	11	38	4	1	5	Schools coming out of mud.
4	32	70	1	2	2	2,400 under poor conditions.
5	43	113				
6	37	150	3	2	5	Volume in lagoon, poor vis.
7	28	179				
9	32	250				
10	32	282				
11	13	295				
12	16	312				
13	14	325				
14	7	333				
15	6	339				
16	8	347				
17	4	351				
18	4	355				
19	4	359				
20	3	362				
21	2	364				
22	1	365				
23	+	366				
Total		366				

[1] Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 34. Comparison of daily sockeye salmon escapement estimates by tower count and aerial survey enumeration methods, in thousands of fish, Togiak River, Bristol Bay, 1990.

	Tower Count		Aerial Survey[1]				
Date	Daily	Cum.	Togiak to Gech.	Gechiak to Ongi.	Ongivinuck to tower	Total	Comments
6/30			40	75	25	140	Good
7/ 1							
2							
3	+	+					
4	1	1					
5	2	3					
6	1	4					
7	1	5	2,700	2,150	150	5,000	Good
8	1	6					
9	2	8					
10	2	10	6,500	9,750	7,250	23,500	Excellent
11	4	14					
12	5	19	2,500	5,220	1,440	9,160	Good
13	5	24					
14	4	28					
15	1	29	4,400	4,100	1,500	10,000	Excellent
16	4	33					
17	4	37	9,860	8,000	4,200	22,060	Excellent
18	5	42					
19	4	46	34,140	13,200	7,200	54,540	Excellent
20	5	51	37,060	11,700	8,400	57,160	Good/Exc.
21	5	56					
22	5	61	16,460	9,100	6,700	32,260	Good
23	5	66					
24	5	71	9,400	9,500	15,400	34,300	Fair/Good
25	9	80					
26	7	87					
27	3	90					
28	4	94					
29	6	100					
30	4	104					
31	4	108					
8/ 1	4	112					
2	5	117					
3	5	122					
4	4	126					
5	2	128					
6	3	131					
7	2	133					
8	2	135					
9	3	138					
Total		142[a]					

[1] Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey. These are unexpanded counts, and are not rounded to the nearest thousand fish.

[a] A post-season adjustment was made or escapement after 8/9 due to the late run timing in 1990.

Table 35. Commercial salmon processors and buyers operating in Bristol Bay, 1990.[a]

Name of Operator/Buyer	Base of Operations	District[1]	Method[2]	Export	Comments
1. All Alaskan Seafoods	P/V Northern Alaskan	K,E,U,N,T	F	Sea	F/V All Alaskan
2. Anpac, Inc.	M/V Nushagak	U,T	F	Sea	M/V Nushagak
3. Bering Pacific Co-op	Naknek	K,E,U	F	Sea	Cons./Lafayette
4. Big Creek Fish, Inc.	Big Creek, Egegik D.	E	F	Air	
5. Brigg Way Co.	Ugashik	U	C	Air	
6. Claxton Alaska Inc.	Seattle	E	F	Sea	
7. Clarks Fish Co.	Egegik	E	F	Sea	
8. Dragnet Fisheries Co.	Dillingham, Kenai	K,E,U,N	F	Air	
9. Farwest Fisheries Inc.	Naknek	K,E,U	C,F	Air	
10. Icicle Seafoods	Dillingham	K,E,U,N	F	Sea/Air	Arctic Star/Bering Star
11. Inlet Fisheries	Naknek, M/V Trident	K,E,U,N	F	Air	Cons./Clark's & K.Crab
12. International Seaf.	Ege. beach, Western Sea	E	F	Air	
13. King Crab	Naknek	K,E,U	F	Air	
14. Lafayette Fisheries	Layfayette & Pribilof	K,E,U	F	Sea/Air	Cons./Bering Pacific
15. Nelbro Packing Co.	Naknek	K,E	C	Sea/Air	
16. New West Fish, Inc.	M/Vs New West/Northland	K,E,U	F	Sea	
17. North Coast Seafoods	M/Vs Polar Bear/Polar Queen	K,E,U,N	F	Sea	
18. Northland Fisheries	M/V Chitose Maru	E,K	F	Sea	
19. Oceanic Seafoods	M/V Barge Harv.	K,E,U	S	Sea	
20. Pan Pacific Seafoods	M/V Pacific Producer	K,E,U	F	Sea	
21. Pederson Point (K.P.)	Pederson Point	K,E	F	Sea	Cons./No. Pacific
22. Peter Pan Seafoods	Dillingham	K,E,U,N,T	C,F	Sea/Air	
23. Queen Fisheries	Queen Slough	K,E,U,N	C,F	Sea/Air	
24. Red Salmon	Naknek	K,E	C,F	Air	
25. Schenk Seafoods Inc.	F/V Fort Yukon	K,E	C	Sea	
26. Smith's No. Pac. Seaf.	Seattle	K,E	F		
27. Snopac	F/V Snowpac 1	K,E,U	F	Air	
28. Sonny's	Ugashik	U	F	Sea	
29. South Naknek Seafoods	South Naknek	K	F	Air	Cons./Wards Cove, R.S.
30. Togiak Fisheries	Togiak Cannery	N,T	F	Air	
31. Trident Seafoods	So. Nak., M/V Ak. Packer	K,E,U,N	C,F	Air	Br.Mon.,Bount.,Neptune,
32. Unisea, Inc.	M/Vs Omnisea/Galaxy	K,E,U,N	F	Air	
33. Wards Cove Packing Co.	Ekuk	K,E,N	C,F	Sea	Cons./R.S.,S.N.S.
34. Western Sea Inc.	Egegik	K,E	F	Sea	
35. Woodbine	Egegik	K,E,U	F	Air	
36. YAK, Inc.	M/V Palisades/Yardarm Knot	K,E,U,N	F	Sea	No. Ak.,Ak. Command

Number of processors: Canning = 9; Freezing = 32; Curing = 1; Air transport = 19; Sea transport = 21

[a] Indicates operators with either a physical plant or processing facility in a district or those operators from other areas buying fish and/or providing tender and support service for fishermen in districts away from the facility.

[1] K=Naknek-Kvichak; E=Egegik; U=Ugashik; N=Nushagak; T=Togiak.

[2] Type of processing: c=canned; f=frozen; s=cured.

Table 36. Case pack and commercial production of frozen and cured salmon by species and district, Bristol Bay, 1990.[a]

Category/ District	No. Operators[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
I. CASE PACK (48 - 1 lb. talls)							
Naknek/Kvichak	6	393,210	1,343	21,053	173	21	415,800
Egegik	0	-	-	-	-	-	-
Ugashik	1	1,376	-	-	-	-	1,376
Nushagak	3	157,608	899	20,428	1,581	336	180,852
Togiak	-	-	-	-	-	-	-
Total	9	552,194	2,242	41,481	1,754	357	598,028
II. FROZEN (lbs.)							
Naknek/Kvichak	28	59,158,866	44,363	1,533,541	1,389,335	54,180	62,180,285
Egegik	26	42,732,539	16,183	309,869	23,255	332,780	43,414,626
Ugashik	20	11,430,636	27,363	183,391	1,000	278,056	11,920,446
Nushagak	12	14,633,951	141,606	957.507	72,387	26,878	15,832,329
Togiak	4	1,743,559	185,952	787,718	31,644	20,820	2,769,693
Total	32	129,699,551	415,467	3,772,026	1,517,621	712,714	136,117,379
III. CURED (lbs.)							
Naknek/Kvichak	1	351,256	50	1,945	0	0	353,251
Egegik	1	56,070	0	0	0	0	56,070
Ugashik	1	521,114	539	1,667	-	-	523,320
Nushagak	-	-	-	-	-	-	-
Togiak	-	-	-	-	-	-	-
Total	1	928,440	589	3,612	0	0	932,641

[a] Includes only fish processed in Bristol Bay. Data extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form.

[1] Because some companies operate in more than one district, the total may be less than the sum of the column.

Table 37. Salmon transported out of the area for processing, by district and species, in pounds, Bristol Bay, 1990.[a]

I. FRESH EXPORT BY AIR

District	No. Operators[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
Naknek/Kvichak	7	15,943,122	15,525	425,187	283,392	31,650	16,698,876
Egegik	3	3,079,569	2,475	122,194	6	45	3,204,289
Ugashik	1	65,600	-	-	-	-	65,600
Nushagak	2	1,063,873	17,588	25,354	0	0	1,106,815
Togiak	1	49,861	19,842	134,158	0	0	203,861
Total		20,202,025	55,430	706,893	283,398	31,695	21,279,441

II. BRINE EXPORT BY SEA[2]

District	No. Operators[1]	No. of Tenders	No. Fish	Pounds
Naknek/Kvichak	5	26	1,895,543	10,787,363
Egegik	8	16	958,212	5,607,478
Ugashik	1	1	39,427	212,908
Nushagak	2	6	147,868	935,820
Togiak	-	-	-	-
Total		49	3,041,050	17,543,569

[1] Because some companies operate in more than one district, the total may be less than the sum of the column.

[2] Some processors report mixed sockeye and chums. Complete species breakdown is generally not available until fish are processed.

[a] Includes all fish exported from Bristol Bay as reported on Final Operations reports (BB-CF/303) or Catch and Production reports, or from fish tickets if reports are unavailable.

Table 38. Mean round weight of the commercial salmon catch, by species and district, in pounds, Bristol Bay, 1990.[a]

District	Sockeye	Chinook	Chum	Pink	Coho	Total
Naknek/Kvichak	5.70	16.14	6.11	3.88	6.06	
Egegik	5.70	15.25	6.11	3.64	7.68	
Ugashik	5.82	16.55	6.03	3.83	8.07	
Nushagak	5.66	17.44	5.88	3.50	6.89	
Togiak	6.61	16.86	7.97	3.51	7.65	
Mean Weight	5.70	16.86	6.25	3.83	7.52	
Total Catch, All Districts[1]	189,369	553	6,301	1,982	749	198,955

[1] Total weight derived from preliminary catch data, and shown in thousands of pounds.

[a] Data extracted from "Bristol Bay Final Operations Reports" (BB-CF/303) and "Bristol Bay Salmon Catch Reports" (BB-CF/301), and is weighted by the catch of each processor against the total catch.

Table 39. Price paid per pound and total exvessel value of the commercial salmon catch by species and district, Bristol Bay, 1990.[a]

Price Paid per Pound[1]

District	Sockeye	Chinook	Chum	Pink	Coho
Nushagak	$1.0409	$.9076	$.2648	$.2671	$.7412
Togiak	1.0028	.9528	.2500	.2134	.7490

Total Exvessel Value[2]

District	Sockeye	Chinook	Chum	Pink	Coho	Total
Nushagak	$21,611	$231	$451	$50	$39	$22,381
Togiak	1,494	197	231	7	16	1,945
Total	$197,114	$502	$1,668	$530	$555	$200,369

[1] Average price per pound derived from individual company price schedules and weighted for each processor. Price information from the Naknek-Kvickak, Egegik, and Ugashik districts was not weighted in 1990, and, therefore, is not reported.

[2] Preliminary catch (in pounds) times district weighted average price. Nushagak weighted average price was used to calculate the total exvessel value. Since most of the major processors operated in the Nushagak district, the weighted mean price paid in the Nushagak District should closely approximate the Bay-wide average. Numbers expressed in thousands.

[a] Data extracted from "Bristol Bay Final Operations Reports" (BB-CF/303). Numbers reported here reflect on-ground exvessel values; price changes and bonuses may occur later.

Table 40. Subsistence salmon catch by species, in number of fish, by district and location fished, Bristol Bay, 1990.[a]

Area/ River System	Permits Issued[1]	Sockeye	Chinook	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT							
Naknek River[2]	284	16,961	777	566	730	510	19,544
Kvichak River							
Igiugig	1	0	0	0	0	0	0
Iliamna	24	8,608	1	0	0	27	8,636
Kijik	2	1,082	0	0	0	0	1,082
Kokhanok	13	11,870	3	1	0	0	11,874
Kvichak River	13	3,941	2	183	178	66	4,370
Lake Clark	13	4,586	0	0	0	0	4,586
Levelock	23	4,747	64	111	124	96	5,142
Newhalen River	44	22,987	138	0	0	0	23,125
Nondalton Village	12	8,364	0	0	0	0	8,364
Pedro Bay/Pile Bay	17	6,627	0	0	0	27	6,654
Port Alsworth	20	2,553	0	0	0	0	2,553
Subtotal	182	75,365	208	295	302	216	76,386
Total N/K	466	92,326	985	861	1,032	726	95,930
EGEGIK DISTRICT[3]	61	1,105	53	85	39	331	1,613
UGASHIK DISTRICT[4]	37	1,578	51	143	120	280	2,172
NUSHAGAK DISTRICT							
Wood River	42	3,391	521	240	87	459	4,698
Nushagak River[5]	86	11,053	5,889	5,242	501	831	23,516
Dillingham Beaches[6]	232	10,369	3,720	1,758	2,276	3,764	21,887
Nushagak Bay Comm[7]	53	3,207	1,094	526	290	545	5,662
Igushik	27	4,806	1,170	24	11	310	6,321
Site Unknown	1	177	13	18	18	10	236
Total Nushagak	441	33,003	12,407	7,808	3,183	5,919	62,320
TOGIAK DISTRICT[8]	37	3,689	480	786	60	1,111	6,126
TOTAL BRISTOL BAY	1,042	131,701	13,976	9,683	4,434	8,367	168,161

1 Numbers reflect actual fishing sites first noted on permit.
2 Includes Mile 5 North, Naknek Beach-North, Naknek River General, Naknek-Kvichak Commercial, Powerline-North, Savonoski-North, Savonoski-South, South Naknek Beach, Telephone Point-North.
3 Includes Egegik and North Egegik.
4 Includes Pilot Point, Pilot Point Village, Ugashik, Ugashik River, and Ugashik Village.
5 Includes the Kokwok River, Koliganek Area, Lewis Point, Mulchatna River, New Stuyahok Area, Portage Creek Area, Black Point, Ekwok Area, and Grassy Island.
6 Includes City Dock, Kanakanak, Olsonville, Scandanavia, Snag Point and Squaw Creek.
7 Includes Clark's Point, Ekuk, Etolin Point, Nushagak Point, Protection Point, and Queen's Slough.
8 Includes Togiak and Togiak River.
a Catches are extrapolated for all permits issued, based on those returned.

BRISTOL BAY SALMON FISHERY

Appendix Tables 1-49

Appendix Table 1. Forecast and inshore chinook salmon run, in thousands of fish, Nushagak District, Bristol Bay, 1973-90.

Year	Forecast: Spawner Recruit	Forecast: Mean Percent	Forecast: Sibling	Inshore Run[1]	Forecast Error (%): Spawner Recruit	Forecast Error (%): Mean Percent	Forecast Error (%): Sibling
1973	328	195	90	72	356	171	25
74	266	164	77	110	142	49	-30
75	284	131	68	99	187	32	-31
76	249	126	118	168	48	-25	-30
77	211	107	146	155	36	-31	- 6
1978	254	105	111	255	0	-59	-56
79	348	147	182	261	33	-44	-30
80	329	206	162	218	51	- 6	-26
81	339	230	198	355	- 5	-35	-44
82	319	256	213	354	-10	-28	-40
1983	322	266	224	311	4	-14	-28
84	236	319	165	152	55	110	9
85	308	434	162	192	60	126	-16
86	299	543	168	122	145	345	38
87	353	366	125	143	147	156	-13
1988			139	84[a]			65
89			129	104[a]			24
90			116	90[a]			29
			Mean Percent Error		83	50	- 9

[1] Inshore Nushagak River commercial catch, subsistence catch, and escapement (does not include sport harvest).

[a] Preliminary.

(Sources: 1, 5, 6, 7, and 16)

Appendix Table 2. Forecast and inshore pink salmon run, in thousands of fish, Nushagak District, Bristol Bay, 1966-90.[a]

Year	Forecast[1]	Inshore Run[2]	Forecast Error (Percent)[3]
1966	2,300	3,779	(39)
68	4,500	3,866	16
1970	2,500	570	339
72	1,400	126	1,011
74	307	999	(69)
76	3,047	1,603	90
78	3,193	13,735	(77)
1980	15,700	4,988	215
82	9,200	2,996	207
84	1,710	6,054	(72)
86	4,067	339	1,100
88	[b]	743[c]	
90	[b]	855[c]	
Mean Absolute Percent Error			247

[1] Based on escapement/return data from Nushagak/Nuyakuk Rivers.
[2] Inshore Nushagak district catch plus escapement.
[3] Percent error = (Forecast-Actual/Actual)x100.
[a] Includes even-years only.
[b] No forecast generated.
[c] Preliminary.

(Sources: 1, 5, and 6)

Appendix Table 3. Salmon fishing license and entry permit registration by gear type and residency, Bristol Bay, 1971-90.[a]

Year	Drift Net[1] Resident	Drift Net[1] Non-resident	Drift Net[1] Total	Set Net[1] Resident	Set Net[1] Non-resident	Set Net[1] Total	Total
1971	1,034	831	1,865	710	136	846	2,711
72	993	771	1,764	722	132	854	2,618
73	2,041	1,162	3,203	902	108	1,010	4,213
74[b]	634 (634)	238 (238)	872	530 (530)	95 (95)	625	1,497
75	1,217 (450)	843 (194)	2,060	751 (159)	169 (45)	920	2,980
1976	987 (69)	734 (30)	1,721	625 (5)	139 (0)	764	2,485
77	999 (52)	729 (13)	1,728	684 (15)	156 (1)	840	2,568
78	1,039 (66)	738 (11)	1,777	749 (16)	161 (3)	910	2,687
79	1,046 (73)	754 (10)	1,800	764 (19)	170 (5)	934	2,734
80	1,060 (92)	767 (18)	1,827	760 (29)	187 (5)	947	2,774
1981	1,056 (89)	771 (18)	1,827	754 (37)	202 (5)	956	2,783
82	1,050 (85)	774 (15)	1,824	744 (36)	213 (5)	957	2,781
83	1,071 (79)	750 (16)	1,821	740 (33)	220 (3)	960	2,781
84	1,050 (73)	768 (16)	1,818	744 (28)	218 (3)	962	2,780
85	1,061 (83)	772 (13)	1,833	733 (24)	217 (4)	950	2,783
1986	1,059 (78)	775 (17)	1,834	727 (18)	223 (4)	950	2,784
87[c]	1,054 (76)	782 (16)	1,836	730 (14)	220 (4)	950	2,786
88[d]	1,035 (78)	802 (12)	1,837	727 (14)	222 (3)	949	2,786
89[e]	1,031 (77)	830 (14)	1,861	772 (14)	235 (4)	1,007	2,868
90[f]	1,039 (78)	841 (15)	1,880	773 (10)	243 (5)	1,016	2,896
20-Year Ave.	1,078	772	1,849	732	183	915	2,765
1971-80 Ave.	1,105	757	1,862	720	145	865	2,727
1981-90 Ave.	1,051	787	1,837	744	221	966	2,803

[1] Allowable gear per license/permit is 150 fathoms for drift and 50 fathoms for set with the following exceptions: 1968 and 1975 - 75 F. drift and 25 F. set; 1969 - 125 F. drift; 1973 - 25 F. drift and 12 1/2 F. set.

[a] Total license/permit registration; not all license/permittee's actually fished.

[b] Limited Entry went into effect. Figures in parenthesis are interim-use permits, and are included in the totals.

[c] Does not include two drift and 11 set net permits available but not renewed for 1987.

[d] Does not include two drift and nine set net permits available but not renewed in 1988.

[e] Does not include five drift and 20 set net permits available but not renewed in 1989.

[f] Does not include three drift and 14 set net permits available but not renewed in 1990.

(Sources: 2 and 15)

Appendix Table 4. Salmon fishing interim-use and permanent entry permits actually fished, by gear type, Bristol Bay, 1975-90.

Year	Permits Issued			Permits Fished	
	Int. Use	Permanent	Total	Number	Percent
		DRIFT GILL NET			
1975	644	1,416	2,060	1,235	60
76	99	1,622	1,721	1,353	79
77	65	1,663	1,728	1,355	78
78	77	1,700	1,777	1,569	88
79	83	1,717	1,800	1,711	95
1980	110	1,717	1,827	1,762	96
81	107	1,720	1,827	1,783	98
82	100	1,724	1,824	1,791	98
83	95	1,726	1,821	1,797	99
84	89	1,729	1,818	1,798	99
1985	96	1,738	1,834	1,813	99
86	95	1,743	1,838	1,800	98
87	93	1,745	1,838	1,799	98
88	90	1,749	1,839	1,839	100
89	91	1,770	1,861	1,860	100
90	93	1,787	1,880		
Average	123	1,581	1,827	1,684	
		SET GILL NET			
1975	204	716	920	445	48
76	5	759	764	501	66
77	16	824	840	495	59
78	19	891	910	650	71
79	24	910	934	768	82
1980	34	913	947	804	85
81	42	914	956	841	88
82	41	916	957	859	90
83	36	924	960	861	90
84	31	931	962	866	90
1985	28	922	950	872	92
86	22	928	950	872	92
87	18	943	950	872	92
88	17	932	949	922	97
89[a]	18	989	1,007	973	97
90	15	1,001	1,016		
Average	36	828	930	773	

[a] Preliminary.

(Source: 15)

Appendix Table 5. Sockeye salmon commercial catch by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	5,857,378	1,306,682	954,068	1,256,799	209,060	9,583,987
72	1,102,365	839,820	17,440	381,347	75,261	2,416,233
73	168,249	221,337	3,920	272,093	95,723	761,322
74	538,163	172,253	2,151	510,571	139,341	1,362,479
75	3,085,416	964,024	14,558	645,902	188,914	4,898,814
1976	2,547,276	1,329,788	174,923	1,265,422	301,883	5,619,292
77	2,167,214	1,780,567	92,623	619,025	218,451	4,877,880
78	5,123,668	1,207,294	7,995	3,137,166	452,016	9,928,139
79	14,991,826	2,257,332	391,118	3,327,346	460,984	21,428,606
80	15,120,457	2,623,066	885,875	4,497,787	634,561	23,761,746
1981	10,992,809	4,361,406	2,116,066	7,493,093	639,707	25,603,081
82	5,005,802	2,447,514	1,139,192	5,916,187	595,696	15,104,391
83	21,559,372	6,755,256	3,349,451	5,119,744	588,208	37,372,031
84	14,546,710	5,190,413	2,658,376	1,992,681	322,126	24,710,306
85	8,179,093	7,537,273	6,468,862	1,307,889	209,766	23,702,883
1986	2,892,171	4,852,935	5,002,949	2,719,313	308,688	15,776,056
87	4,986,002	5,356,669	2,128,652	3,254,720	342,732	16,068,775
88[a]	3,549,422	6,400,126	1,531,615	1,708,039	816,782	14,005,984
89[a]	13,878,778	8,700,824	3,185,062	2,856,988	88,451	28,710,103
90[a]	17,126,625	10,086,953	2,144,268	3,569,308	237,499	33,164,653
20-Year Ave.	7,670,940	3,719,577	1,613,458	2,592,571	346,292	15,942,838
1971-80 Ave.	5,070,201	1,270,216	254,467	1,591,346	277,619	8,463,850
1981-90 Ave.	10,271,678	6,168,937	2,972,449	3,593,796	414,966	23,421,826

[a] Preliminary.

(Sources: 1 and 5)

Appendix Table 6. Chinook salmon commercial catch by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	10,254	2,187	779	82,769	27,026	123,015
72	2,262	1,097	166	46,045	19,976	69,546
73	951	1,475	292	30,470	10,856	44,044
74	480	1,133	1,200	32,053	10,798	45,664
75	964	237	111	21,454	7,226	29,992
1976	4,064	1,138	338	60,684	29,744	95,968
77	4,373	3,694	2,167	85,074	35,218	130,526
78	6,930	3,126	5,935	118,548	57,000	191,539
79	10,415	5,547	9,568	157,321	30,022	212,873
80	7,517	5,610	4,900	64,958	12,543	95,528
1981	11,048	5,468	3,416	193,461	23,911	237,304
82	12,425	4,834	7,170	195,287	33,786	253,502
83	8,955	4,758	9,276	137,123	38,497	198,609
84	8,972	4,680	4,767	61,378	22,179	101,976
85	5,697	4,015	5,840	67,783	37,106	120,441
1986	3,188	1,883	2,982	65,783	19,880	93,716
87	5,175	2,959	4,065	45,983	17,217	75,399
88[a]	6,677	3,023	3,319	16,501	15,615	45,135
89[a]	6,463	1,776	2,140	17,887	11,604	39,870
90[a]	3,749	1,048	1,690	14,092	12,241	32,820
20-Year Ave.	6,028	2,984	3,506	75,733	23,622	111,873
1971-80 Ave.	4,821	2,524	2,546	69,938	24,041	103,870
1981-90 Ave.	7,235	3,444	4,467	81,528	23,204	119,877

[a] Preliminary.

(Sources: 1 and 5)

Appendix Table 7. Chum salmon commercial catch by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	151,465	27,073	14,506	360,015	123,847	676,906
72	115,737	42,172	9,689	310,126	178,885	656,609
73	123,610	23,034	6,092	336,331	195,431	684,498
74	41,347	4,022	2,334	157,941	80,710	286,354
75	79,740	4,094	1,634	152,891	87,058	325,417
1976	317,550	46,955	9,924	801,064	153,559	1,329,052
77	340,228	83,121	4,465	899,701	270,649	1,598,164
78	185,451	44,480	1,449	651,743	274,967	1,158,090
79	196,398	38,004	12,174	440,279	219,942	906,797
80	204,515	78,556	36,343	681,930	299,682	1,301,026
1981	355,943	87,581	36,275	795,143	229,886	1,504,828
82	198,019	84,329	53,204	434,817	151,000	921,369
83	351,769	127,490	105,171	725,060	322,691	1,632,181
84	447,259	178,096	210,611	850,114	336,660	2,022,740
85	210,107	126,736	131,576	396,740	203,302	1,068,461
1986	262,925	94,666	111,112	488,375	270,057	1,227,135
87	446,908	145,259	101,074	416,476	419,425	1,529,142
88[a]	298,966	244,745	92,360	370,223	470,721	1,477,015
89[a]	308,970	129,365	84,468	446,155	203,054	1,172,012
90[a]	425,493	128,229	32,078	306,452	115,711	1,007,963
20-Year Ave.	253,120	82,900	52,827	501,079	230,362	1,124,288
1971-80 Ave.	175,604	39,151	9,861	479,202	188,473	892,291
1981-90 Ave.	330,636	134,650	95,793	522,956	272,251	1,356,285

[a] Preliminary.

(Sources: 1 and 5)

Appendix Table 8. Pink salmon commercial catch by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	2	0	0	37	173	212
72	57,074	12	0	67,953	1,984	127,023
73	109	0	1	61	216	387
74	508,534	4,405	340	413,613	13,086	939,978
75	6	9	2	126	279	422
1976	264,631	4,121	116	739,590	28,085	1,036,543
77	19	0	5	3,017	1,476	4,517
78	734,880	11,430	530	4,348,336	57,524	5,152,700
79	134	6	9	1,787	1,913	3,849
80	288,363	2,476	51	2,202,545	70,033	2,563,468
1981	194	222	29	345	6,490	7,280
82	127,560	1,997	170	1,339,272	23,417	1,492,416
83	51	92	0	137	204	484
84	211,306	5,759	2,387	3,127,153	19,468	3,366,073
85	39	51	3	48	316	457
1986	106,919	2,749	98	267,117	24,404	401,287
87	5	0	30	2	20	57
88[a]	625,551	4,437	210	248,656	57,016	935,870
89[a]	100	8	32	151	217	508
90[a]	447,757	7,149	260	53,286	9,014	517,466
20-Year Ave.[1]	337,258	4,454	416	1,280,752	30,403	1,653,282
1971-80 Ave.[1]	370,696	4,489	207	1,554,407	34,142	1,963,942
1981-90 Ave.[1]	303,819	4,418	625	1,007,097	26,664	1,342,622

[1] Includes even-numbered years only.
[a] Preliminary.

(Sources: 1 and 5)

Appendix Table 9. Coho salmon commercial catch by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	89	923	469	8,036	3,192	12,709
72	402	1,249	0	3,654	8,652	13,957
73	255	2,701	2,307	28,709	23,070	57,042
74	916	1,156	4,055	12,569	25,049	43,745
75	43	951	4,595	7,342	33,350	46,281
1976	1,195	2,321	3,561	6,778	12,791	26,646
77	2,883	2,685	3,884	52,562	45,201	107,215
78	913	2,256	2,024	44,740	44,338	94,271
79	12,355	15,148	17,886	129,607	119,403	294,399
80	7,802	22,537	19,419	147,726	151,000	348,484
1981	1,229	32,759	30,220	220,290	29,207	313,705
82	10,586	74,989	50,803	349,669	133,765	619,812
83	7,282	25,954	7,816	81,338	5,711	128,101
84	3,209	66,589	68,451	260,310	176,053	574,612
85	10,474	32,667	60,815	20,230	38,636	162,822
1986	5,824	33,607	25,770	68,568	48,306	182,075
87	5,274	30,789	14,785	13,263	1,292	65,403
88[a]	28,352	49,407	52,272	53,125	18,595	201,751
89[a]	22,551	49,106	32,354	77,073	57,300	238,384
90[a]	13,403	44,275	31,731	7,447	2,719	99,575
20-Year Ave.	6,752	24,603	21,661	79,652	48,882	181,549
1971-80 Ave.	2,685	5,193	5,820	44,172	46,605	104,475
1981-90 Ave.	10,818	44,014	37,502	115,131	51,158	258,624

[a] Preliminary.

(Sources: 1 and 5)

Appendix Table 10. Total salmon commercial catch by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	6,019,188	1,336,865	969,822	1,707,656	363,298	10,396,829
72	1,277,840	884,350	27,295	809,125	284,758	3,283,368
73	293,174	248,547	12,612	667,664	325,296	1,547,293
74	1,089,440	182,969	10,080	1,126,747	268,984	2,678,220
75	3,166,169	969,315	20,900	827,715	316,827	5,300,926
1976	3,134,716	1,384,323	188,862	2,873,538	526,062	8,107,501
77	2,514,717	1,870,067	103,144	1,659,379	570,995	6,718,302
78	6,051,842	1,268,586	17,933	8,300,533	885,845	16,524,739
79	15,211,128	2,316,037	430,755	4,056,340	832,264	22,846,524
80	15,628,654	2,732,245	946,588	7,594,946	1,167,819	28,070,252
1981	11,361,223	4,487,436	2,186,006	8,702,332	929,201	27,666,198
82	5,354,392	2,613,663	1,250,539	8,235,232	937,664	18,391,490
83	21,927,429	6,913,550	3,471,714	6,063,402	955,311	39,331,406
84	15,217,456	5,445,537	2,944,592	6,291,636	876,486	30,775,707
85	8,405,410	7,700,742	6,667,096	1,792,690	489,126	25,055,064
1986	3,271,027	4,985,840	5,142,911	3,609,156	671,335	17,680,269
87	5,443,364	5,535,676	2,248,606	3,730,444	780,686	17,738,776
88[a]	4,508,968	6,701,738	1,679,776	2,396,544	1,378,729	16,665,755
89[a]	14,216,862	8,881,079	3,304,056	3,398,254	360,626	30,160,877
90[a]	18,017,027	10,267,654	2,210,027	3,950,585	377,184	34,822,477
20-Year Ave.	8,105,501	3,836,311	1,691,666	3,889,696	664,925	18,188,099
1971-80 Ave.	5,438,687	1,319,330	272,799	2,962,364	554,215	10,547,395
1981-90 Ave.	10,772,316	6,353,292	3,110,532	4,817,028	775,635	25,828,802

[1] Preliminary.

(Sources: 1 and 5)

Appendix Table 11. Commercial salmon catch, in percent, by gear type and species, Bristol Bay, 1968-87.

Year	Sockeye		King		Chum		Pink[1]		Coho		Total	
	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set
1968	90	10	98	2	95	5	89	11	76	24	90	10
69	88	12	96	4	95	5	84	16	75	25	89	11
70	93	7	94	6	94	6	82	18	45	55	93	7
71	90	10	98	2	94	6	85	15	64	36	90	10
72	93	7	98	2	95	5	75	25	84	16	93	7
1973	92	8	97	3	96	4	86	14	75	25	93	7
74	79	21	97	3	95	5	89	11	75	25	84	16
75	91	9	96	4	94	6	61	39	80	20	91	9
76	90	10	94	6	96	4	89	11	63	37	91	9
77	89	11	96	4	96	4	88	12	83	17	90	10
1978	88	12	97	3	95	5	89	11	76	24	89	11
79	87	13	94	6	92	8	73	27	79	21	88	12
80	86	14	89	11	91	9	88	12	78	22	86	14
81	84	16	92	8	92	8	67	33	73	27	85	15
82	87	13	92	8	90	10	74	26	74	26	86	14
1983	89	11	88	12	93	7	45	55	55	45	90	10
84	90	10	88	12	87	13	79	21	77	23	88	12
85	90	10	81	19	89	11	54	46	63	37	90	10
86	84	16	88	12	92	8	60	40	70	30	85	15
87	87	13	79	21	88	12	56	44	41	59	87	13
20-Year Ave.	89	12	95	5	94	6	81	19	72	28	89	11
1968-77 Ave.	90	11	96	4	95	5	85	15	72	28	90	10
1978-87 Ave.	87	13	89	11	91	9	78	22	69	31	87	13

[1] Averages include even-years only.

(Source: 5)

Appendix Table 12. Commercial salmon catch, in percent, by gear type and district, Bristol Bay, 1968-87.[a]

Year	Naknek-Kvichak		Egegik		Ugashik		Nushagak		Togiak		Total	
	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set	Drift	Set
1968	85	15	93	7	81	19	91	9	98	2	90	10
69	91	9	80	20	82	18	83	17	99	1	89	11
70	96	4	84	16	76	24	77	23	99	1	93	7
71	92	8	87	13	89	11	82	18	100	0	90	10
72	94	6	90	10	46	54	93	7	100	0	93	7
1973	89	11	89	11	84	16	94	6	99	1	93	7
74	84	16	77	23	53	47	83	17	94	6	84	16
75	93	7	90	10	85	15	83	17	93	7	91	9
76	92	8	90	10	89	11	90	10	93	7	91	9
77	90	10	88	12	87	13	93	7	93	7	90	10
1978	90	10	83	17	94	6	89	11	87	13	89	11
79	90	10	77	23	83	17	84	16	86	14	88	12
80	89	11	71	29	88	12	87	13	86	14	86	14
81	88	12	76	24	89	11	83	17	82	18	85	15
82	86	14	81	19	84	16	87	13	86	14	86	14
1983	92	8	86	14	93	7	85	15	84	16	90	10
84	90	10	91	9	91	9	82	18	84	16	88	12
85	87	13	92	8	96	4	70	30	82	18	90	10
86	71	29	89	11	95	5	76	24	77	23	84	16
87	85	15	90	10	93	7	80	20	74	26	86	14
20-Year Ave.	89	11	85	15	84	16	85	15	90	11	89	11
1968-77 Ave.	91	9	87	13	77	23	87	13	97	4	90	10
1978-87 Ave.	87	13	84	16	91	9	82	18	83	17	87	13

[a] All salmon species combined.

(Source: 5)

Appendix Table 13. Sockeye salmon escapement by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak[1]	Egegik[2]	Ugashik[3]	Nushagak[4]	Togiak[5]	Total
1971	3,510,448	634,014	529,752	1,353,382	213,242	6,240,838
72	1,747,668	546,402	79,428	528,650	81,970	2,984,118
73	618,510	328,842	38,988	581,307	114,930	1,682,577
74	5,889,750	1,275,630	61,854	2,267,468	108,492	9,603,194
75	15,267,616	1,173,840	429,336	2,273,038	189,162	19,332,992
1976	3,367,854	509,160	356,308	1,486,276	200,590	5,920,188
77	2,527,000	692,514	201,520	1,220,056	202,634	4,843,724
78	5,192,066	895,698	82,434	3,485,532	340,076	9,995,806
79	12,437,996	1,032,042	1,706,904	3,073,571	224,838	18,475,351
80	25,447,866	1,060,860	3,335,284	8,310,438	572,450	38,726,898
1981	3,632,788	694,680	1,327,699	2,850,637	365,910	8,871,714
82	2,529,692	1,034,628	1,185,551	2,012,742	341,424	7,104,037
83	4,554,496	792,282	1,001,364	1,948,492	239,610	8,536,244
84	11,948,514	1,165,320	1,270,318	1,814,686	200,778	16,399,616
85	9,179,014	1,095,192	1,006,407	1,684,796	190,082	13,155,491
1986	3,387,147	1,151,750	1,015,582	2,133,398	271,184	7,959,061
87	7,281,896	1,273,553	686,894	1,895,961	316,076	11,454,380
88	5,297,708	1,612,745	654,412	1,524,752	340,712	9,430,329
89	9,676,244	1,611,566	1,713,287	2,189,501	125,080	15,315,678
90	9,231,176	2,191,582	749,478	2,138,726	278,202	14,589,164
20-Year Ave.	7,136,272	1,038,615	871,640	2,238,670	245,872	11,531,070
1971-80 Ave.	7,600,677	814,900	682,181	2,457,972	224,838	11,780,569
1981-90 Ave.	6,671,868	1,262,330	1,061,099	2,019,369	266,906	11,281,571

1 Includes Kvichak, Branch and Naknek Rivers.
2 Includes Egegik River. Also includes King Salmon River in 1986-90.
3 Includes Mother Goose River system in 1976-90 and Dog Salmon River system in 1984-90.
4 Includes Wood, Igushik, Nuyakuk, Nushagak-Mulchatna and Snake Rivers.
5 Includes Togiak River, Lake and tributaries, Kulukak system and other miscellaneous river systems.

(Sources: 1 and 7)

Appendix Table 14. Inshore commercial catch and escapement of sockeye salmon in the Naknek-Kvichak District by river system, in numbers of fish, Bristol Bay, 1971-90.

Year	Catch	Escapement				Total Run
		Kvichak[1]	Branch[2]	Naknek[1]	Total	
1971	5,857,378	2,387,392	187,302	935,754	3,510,448	9,367,826
72	1,102,365	1,009,962	151,188	586,518	1,747,668	2,850,033
73	168,249	226,554	35,280	356,676	618,510	786,759
74	538,163	4,433,844	214,848	1,241,058	5,889,750	6,427,913
75	3,085,416	13,140,450	100,480	2,026,686	15,267,616	18,353,032
1976	2,547,276	1,965,282	81,822	1,320,750	3,367,854	5,915,130
77	2,167,214	1,341,144	100,000	1,085,856	2,527,000	4,694,214
78	5,123,668	4,149,288	229,400	813,378	5,192,066	10,315,734
79	14,991,826	11,218,434	294,200	925,362	12,437,996	27,429,822
80	15,120,457	22,505,268	297,900	2,644,698	25,447,866	40,568,323
1981	10,992,809	1,754,358	82,210	1,796,220	3,632,788	14,625,597
82	5,005,802	1,134,840	239,300	1,155,552	2,529,692	7,535,494
83	21,559,372	3,569,982	96,220	888,294	4,554,496	26,113,868
84	14,546,710	10,490,670	215,370	1,242,474	11,948,514	26,495,224
85	8,179,093	7,211,046	118,030	1,849,938	9,179,014	17,358,107
1986	2,892,171	1,179,322	230,180	1,977,645	3,387,147	6,279,318
87	4,986,002	6,065,880	154,210	1,061,806	7,281,896	12,267,898
88	3,549,422[a]	4,065,216	194,630	1,037,862	5,297,708	8,847,130
89	13,878,778[a]	8,317,500	196,760	1,161,984	9,676,244	23,555,022
90	17,126,625[a]	6,970,020	168,578[a]	2,092,578	9,231,176	26,357,801
20-Year Ave.	7,670,940	5,656,823	169,395	1,310,054	7,136,272	14,807,212
1971-80 Ave.	5,070,201	6,237,762	169,242	1,193,674	7,600,677	12,670,879
1981-90 Ave.	10,271,678	5,075,883	169,549	1,426,435	6,671,868	16,943,546

[1] Tower count.
[2] Tower count 1970-76 and aerial survey estimates 1977-90.
[a] Preliminary.

(Sources: 1, 7, 13 and 14)

Appendix Table 15. Inshore sockeye salmon total run by river system, Naknek-Kvichak District, in thousands of fish, Bristol Bay, 1971-90.

Year	Kvichak		Branch		Naknek		Total Run[1]
	Number	%	Number	%	Number	%	
1971	6,152	66	509	5	2,706	29	9,368
72	1,352	47	183	6	1,315	46	2,850
73	248	32	37	5	501	64	787
74	4,582	71	225	4	1,621	25	6,428
75	14,746	80	114	1	3,493	19	18,353
1976	3,423	58	137	2	2,354	40	5,915
77	2,081	44	150	3	2,463	52	4,694
78	7,965	77	455	4	1,896	18	10,316
79	24,637	90	573	2	2,219	8	27,430
80	35,248	87	561	1	4,759	12	40,568
1981	6,989	48	311	2	7,326	50	14,626
82	2,993	40	772	10	3,770	50	7,535
83	20,105	77	557	2	5,452	21	26,114
84	23,014	87	555	2	2,926	11	26,495
85	13,394	77	264	2	3,699	21	17,358
1986	1,966	31	399	6	3,913	62	6,279
87	9,593	78	297	2	2,378	19	12,268
88[a]	6,772	77	322	4	1,753	20	8,847
89[a]	19,831	84	535	2	3,189	14	23,555
90[a]	17,439	66	550	2	8,369	32	26,358
20-Year Ave.	11,126	66	375	3	3,305	31	14,807
1971-80 Ave.	10,043	65	295	3	2,333	31	12,671
1981-90 Ave.	12,210	66	456	3	4,277	30	16,944

[1] Due to rounding, the district total runs may not equal the sum of the rows.

[a] Preliminary apportionment.

(Sources: 1 and 7)

Appendix Table 16. Inshore commercial catch and escapement of sockeye salmon in the Egegik District by river system, Bristol Bay, 1971-90.

Year	Catch	Escapement		
		Egegik[1]	King Salmon[2]	Total Run
1971	1,306,682	634,014		1,940,696
72	839,820	546,402		1,386,222
73	221,337	328,842		550,179
74	172,253	1,275,630		1,447,883
75	964,024	1,173,840		2,137,864
1976	1,329,788	509,160		1,838,948
77	1,780,567	692,514		2,473,081
78	1,207,294	895,698		2,102,992
79	2,257,332	1,032,042		3,289,374
80	2,623,066	1,060,860		3,683,926
1981	4,361,406	694,680		5,056,086
82	2,447,514	1,034,628		3,482,142
83	6,755,256	792,282		7,547,538
84	5,190,413	1,165,320	25	6,355,758
85	7,537,273	1,095,192		8,632,465
1986	4,852,935	1,151,320	430	6,005,115
87	5,356,669	1,272,978	575	6,630,222
88	6,400,126[a]	1,612,745[b]		8,012,871[a]
89	8,700,824[a]	1,610,966[b]	600	10,312,390[a]
90	10,086,953[a]	2,191,362[b]	220	12,278,535[a]
20-Year Average	3,719,577	1,038,545		4,758,122
1971-80 Average	1,270,216	814,900		2,085,117
1981-90 Average	6,168,937	1,262,190	370	7,431,312

[1] Tower count.
[2] Aerial survey.
[a] Preliminary.
[b] Includes aerial count of Shosky Creek.

(Source: 1, 7, and 13)

Appendix Table 17. Inshore commercial catch and escapement of sockeye salmon in the Ugashik District by river system, Bristol Bay, 1971-90.

Year	Catch	Escapement			Total Run
		Ugashik[1]	King Salmon[2]	Dog Salmon[2]	
1971	954,068	529,752			1,483,820
72	17,440	79,428			96,868
73	3,920	38,988			42,908
74	2,151	61,854			64,005
75	14,558	429,336			443,894
1976	174,923	341,808	14,500		531,231
77	92,623	201,486	34		294,143
78	7,995	70,434	12,000		90,429
79	391,118	1,700,904	6,000		2,098,022
80	885,875	3,321,384	13,900		4,221,159
1981	2,116,066	1,326,762	937		3,443,765
82	1,139,192	1,157,526	28,025		2,324,743
83	3,349,451	1,000,614	750		4,350,815
84	2,658,376	1,241,418	17,100	11,800	3,928,694
85	6,468,862	998,232	7,400	775	7,475,269
1986	5,002,949	1,001,492	4,310	9,780	6,018,531
87	2,128,652	668,964	15,855	2,075	2,815,546
88	1,531,615[a]	642,972	8,360	3,080	2,186,027[a]
89	3,185,062[a]	1,681,302	25,480	6,505	4,898,349[a]
90	2,144,268[a]	730,038	11,340	8,100	2,893,746[a]
20-Year Ave.	1,613,460	861,235			2,474,694
1971-80 Ave.	254,470	677,537			936,651
1981-90 Ave.	2,972,449	1,044,932	11,956	6,016[b]	4,033,549

[1] Tower count.
[2] Aerial survey.
[a] Preliminary.
[b] 1984-90 only.

(Source: 1, 7 and 13)

Appendix Table 18. Inshore commercial catch and escapement of sockeye salmon in the Nushagak District by river system, in numbers of fish, Bristol Bay, 1971-90.

Year	Catch	Escapement							Total Run
		Wood[1]	Igushik[1]	Nuyakuk[1]	Nush/Mul[2]	Nushagak[3]	Snake[4]	Total	
1971	1,256,799	851,202	210,960	224,382	58,336		8,500	1,353,380	2,610,179
72	381,347	430,602	60,018	28,596	7,434		2,000	528,650	909,997
73	272,093	330,474	59,508	110,016	80,394		915	581,307	853,400
74	510,571	1,708,836	358,752	154,614	30,000		15,266	2,267,468	2,778,039
75	645,902	1,270,116	241,086	669,918	82,400		9,518	2,273,038	2,918,940
1976	1,265,422	817,008	186,120	425,220	45,200		12,728	1,486,276	2,751,698
77	619,025	561,828	95,970	232,554	320,400		9,304	1,220,056	1,839,081
78	3,137,166	2,267,238	536,154	576,666	87,400		18,074	3,485,532	6,622,698
79	3,327,346	1,706,352	859,560	360,120	139,100		8,439	3,073,571	6,400,917
80	4,497,787	2,969,040	1,987,530	3,026,568	290,800		36,500	8,310,438	12,808,225
1981	7,493,093	1,233,318	591,144	834,204	177,400		14,571	2,850,637	10,343,730
82	5,916,187	976,470	423,768	537,864	63,000		11,640	2,012,742	7,928,929
83	5,119,744	1,360,968	180,438	318,606	85,400		3,080	1,948,492	7,068,236
84	1,992,681	1,002,792	184,872	472,596	120,586		33,840	1,814,686	3,807,367
85	1,307,889	939,000	212,454	429,162	69,300		34,880	1,684,796	2,992,685
1986	2,719,313	818,652	307,728	821,898	168,340		16,780	2,133,398	4,852,711
87	3,254,720	1,337,172	169,236	163,000	225,033		1,520	1,895,961	5,150,681
88	1,708,039[a]	866,778	170,454	319,992	163,208		4,320	1,524,752	3,232,791
89	2,856,988[a]	1,186,410	461,610			513,421	28,060	2,189,501	5,046,489
90	3,569,308[a]	1,069,440	365,850			674,596[a]	28,840	2,138,726	5,708,034
20-year Ave.	2,592,571	1,185,185	383,161	539,221[b]	122,985[b]		14,939	2,238,670	4,831,241
1971-80 Ave.	1,591,346	1,291,270	459,566	580,865	114,146		12,124	2,457,972	4,049,317
1981-90 Ave.	3,593,796	1,079,100	306,755	487,165[b]	134,033[b]	594,009	17,753	2,019,369	5,613,165

1 Tower count.

2 Tower counts 1973-74, aerial survey estimates 1977-83, 1985, and 1987; sonar counts 1984 and 1988. Tower not operated in 1971-72 and 1975-76; escapement estimates for these years and 1986 were based on the average ratio of Nuyakuk/Nushagak-Mulchatna River system in years when data was available.

3 Total run to Nuyakuk and Nushagak-Mulchatna rivers can not be calculated after 1988; therefore, total run from 1989 on will be determined for the entire Nushagak River drainage using Portage Creek escapement numbers and age composition.

4 Aerial survey estimate 1971-72, 1980, 1982-86, 1989 and 1990; weir count 1973-79 and 1981.

a Preliminary.

b Averages thru 1988.

(Sources: 1, 7, and 13)

Appendix Table 19. Inshore sockeye salmon total run by river system, in thousands of fish and percent, Nushagak District, Bristol Bay, 1971-90.

Year	Wood		Igushik		Nuyakuk		Nush-Mul		Nushagak[1]		Snake		Total Run[2]
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	
1971	1,607	62	439	17	498	19	58	2			9	0	2,611
72	718	79	117	13	65	7	7	1			2	0	909
73	479	56	88	10	162	19	124	15			1	0	854
74	2,099	76	442	16	187	7	34	1			15	1	2,777
75	1,640	56	319	11	868	30	82	3			10	0	2,919
1976	1,438	52	345	13	845	31	100	4			24	1	2,752
77	834	45	146	8	358	19	488	27			12	1	1,838
78	4,117	62	1,084	16	1,302	20	87	1			33	0	6,623
79	3,638	57	1,842	29	764	12	138	2			18	0	6,400
80	4,529	35	3,126	24	4,826	38	291	2			37	0	12,809
1981	4,568	44	2,229	22	3,318	32	177	2			52	1	10,344
82	3,471	44	1,818	23	2,079	26	550	7			12	0	7,930
83	4,272	60	813	12	1,379	20	601	9			3	0	7,068
84	1,982	52	435	11	906	24	451	12			20	1	3,794
85	1,593	53	460	15	697	23	208	7			35	1	2,993
1986	1,772	37	877	18	1,762	36	425	9			17	0	4,853
87	2,828	55	617	12	589	11	1,116	22			2	0	5,152
88[a]	1,750	54	406	13	649	20	424	13			4	0	3,233
89[a]	2,552	51	1,232	24					1,234	24	28	1	5,046
90[a]	2,647	46	1,267	22					1,765	31	29	1	5,708
20-Year Ave.	2,427	54	905	16	1,181	22[b]	298	8[b]			18	0	4,831
1971-80 Ave.	2,110	58	795	16	988	20	141	6			16	0	4,049
1981-90 Ave.	2,744	50	1,015	17	1,423	24[b]	494	10[b]	1,500	28	20	0	5,612

[1] Total run to Nuyakuk, Nushagak, and Mulchatna rivers can not be calculated after 1988; therefore, total run from 1989 on will be determined for the entire Nushagak River drainage using Portage Creek escapement numbers and age composition.

[2] Due to rounding of river system total runs, the district total run may not equal the actual shown on Appendix Table 21.

[a] Preliminary apportionment.

[b] Averages and percentages thru 1988.

(Sources: 1 and 7)

Appendix Table 20. Inshore commercial catch and escapement of sockeye salmon in the Togiak District, by river system, in numbers of fish, Bristol Bay, 1971-90.

Year	Catch				Escapement						
					Togiak						
	Togiak	Kulukak	Os/Mat[1]	Total	Lake[2]	River[3]	Tributaries[4]	Kulukak[5]	Other[6]	Total	Total Run
1971	200,507	7,927	626	209,060	190,842		9,400	13,000		213,242	422,302
72	51,354	17,244	6,663	75,261	74,070		4,500	3,400		81,970	157,231
73	75,694	15,551	4,478	95,723	95,730		11,200	8,000		114,930	210,653
74	110,886	13,615	14,840	139,341	82,992	12,000	8,600	4,900		108,492	247,833
75	184,856	3,821	237	188,914	160,962	12,200	7,400	8,600		189,162	378,076
1976	293,016	4,822	4,045	301,883	158,190	15,000	16,200	11,200		200,590	502,473
77	201,004	16,252	1,195	218,451	133,734	4,400	24,400	40,100		202,634	421,085
78	422,100	29,668	248[a]	452,016	273,576	15,000	17,600	33,900		340,076	792,092
79	393,337	66,629	1,018	460,984	171,138	14,200	12,900	26,600		224,838	685,822
80	591,470	42,811	280	634,561	461,850	27,900	37,000	45,700		572,450	1,207,011
1981	620,288	19,246	173	639,707	208,080	21,150	77,900	58,780		365,910	1,005,617
82	581,718	13,952	26	595,696	244,824	3,450	40,400	52,750		341,424	937,120
83	529,775	55,906	2,527	588,208	191,520	7,200	13,920	26,970		239,610	827,818
84	213,213	96,709	12,204	322,126	95,448	15,830	39,700	49,800		200,778	522,904
85	133,263	44,120	32,383	209,766	136,542	3,600	13,340	36,600		190,082	399,848
1986	191,158	100,466	17,064	308,688	168,384	20,000	15,000	42,800	25,000	271,184	579,872
87	274,613	45,401	22,718	342,732	249,676	10,400	18,200	37,800	----	316,076	658,808
88	674,715	136,325	5,742	816,782[b]	276,612	18,800	13,600	31,700	----	340,712	1,157,494
89	68,268	13,945	6,238	88,451[b]	84,480	15,200	4,560	20,840	----	125,080	213,531
90	184,285	41,698	11,516	237,499[b]	141,977	17,540	29,605	49,600	39,480	278,202	515,701
20-Year Ave.[7]	299,776	39,305	7,211	346,292	180,031	13,757	20,771	30,152		245,872	592,165
1971-80 Ave.	252,422	21,834	3,363	277,619	180,308	14,386	14,920	19,540		224,838	502,458
1981-90 Ave.	347,130	56,777	11,059	414,966	179,754	13,317	26,623	40,764	32,240	266,906	681,871

1 Catches in the Osviak and Matogak sections were combined.
2 Tower count.
3 Aerial survey estimate.
4 Aerial survey estimate includes Gechiak, Pungokepuk, Kemuk, Nayorurun, and Ongivinuck River systems. Aerial survey estimates prior to 1986 also include Ungalikthluk, Negukthlik, Matogak, Osviak, and other miscellaneous river systems when surveyed.
5 Aerial survey estimate includes Kulukak River and Lake and Tithe Creek ponds.
6 Aerial survey estimate includes Matogak, Osviak, Slug, Negukthlik, Ungalikthluk, and Quigmy Rivers. Prior to 1986 estimates for these systems were included under tributaries when surveyed.
7 Only years and systems with catch/escapement data were included in calculating averages.
a Includes 248 fish from Cape Peirce Section.
b Preliminary.

(Source: 1, 7, and 13)

Appendix Table 21. Inshore total run of sockeye salmon by district, in numbers of fish, Bristol Bay, 1971-90.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1971	9,367,826	1,940,696	1,483,820	2,610,179	422,302	15,824,825
72	2,850,033	1,386,222	96,868	909,997	157,231	5,400,351
73	786,759	550,179	42,908	853,400	210,653	2,443,899
74	6,427,913	1,447,883	64,005	2,778,039	247,833	10,965,673
75	18,353,032	2,137,864	443,894	2,918,940	378,076	24,231,806
1976	5,915,130	1,838,948	531,231	2,751,698	502,473	11,539,480
77	4,694,214	2,473,081	294,143	1,839,081	421,085	9,721,604
78	10,315,734	2,102,992	90,429	6,622,698	792,092	19,923,945
79	27,429,822	3,289,374	2,098,022	6,400,917	685,822	39,903,957
80	40,568,323	3,683,926	4,221,159	12,808,225	1,207,011	62,488,644
1981	14,625,597	5,056,086	3,443,765	10,343,730	1,005,617	34,474,795
82	7,535,494	3,482,142	2,324,743	7,928,929	937,120	22,205,428
83	26,113,868	7,547,538	4,350,815	7,068,236	827,818	45,908,275
84	26,495,224	6,355,758	3,928,694	3,807,367	522,904	41,109,947
85	17,358,107	8,632,465	7,475,269	2,992,685	399,848	36,858,374
1986	6,279,318	6,005,115	6,018,531	4,852,711	579,872	23,735,547
87	12,267,898	6,630,222	2,815,546	5,150,681	658,808	27,523,155
88[a]	8,847,130	8,012,871	2,186,027	3,232,791	1,157,494	23,436,313
89[a]	23,555,022	10,312,390	4,898,349	5,046,489	213,531	44,025,781
90[a]	26,357,801	12,278,535	2,893,746	5,708,034	515,701	47,753,817
20-Year Ave.	14,807,212	4,758,214	2,485,098	4,831,091	592,165	27,473,781
1971-80 Ave.	12,670,879	2,085,117	936,648	4,049,318	502,458	20,244,418
1981-90 Ave.	16,943,546	7,431,312	4,033,549	5,612,865	681,871	34,703,143

[a] Preliminary.

(Sources: 1 and 7)

Appendix Table 22. Kvichak River sockeye salmon escapement and return by brood year, Bristol Bay, 1955-90.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1955	251	0	265	689	550	0	1,504	5.99
56	9,433	14	24,280	13,425	1,308	0	39,027	4.14
57	2,843	8	243	3,577	261	2	4,091	1.44
58	535	0	77	183	26	3	289	0.54
59	680	0	213	323	11	0	547	0.80
1960	14,630	0	1,449	47,306	6,493	6	55,254	3.78
61	3,706	1	334	2,483	684	0	3,502	0.94
62	2,581	0	106	4,825	420	4	5,355	2.07
63	339	0	52	689	369	9	1,119	3.30
64	957	8	2,337	2,748	655	3	5,751	6.01
1965	24,326	25	10,337	33,421	1,240	1	45,024	1.85
66	3,775	15	513	5,347	385	1	6,261	1.66
67	3,216	0	356	1,084	87	0	1,527	0.47
68	2,557	0	293	112	137	2	544	0.21
69	8,394	0	137	4,543	613	11	5,304	0.63
1970	13,935	1	83	14,480	1,261	7	15,832	1.14
71	2,387	0	263	2,263	305	0	2,831	1.19
72	1,010	0	256	1,365	319	0	1,940	1.92
73	227	0	580	1,303	574	0	2,457	10.82
74	4,434	9	6,639	18,734	915	5	26,302	5.93
1975	13,140	5	5,984	31,432	625	0	38,046	2.90
76	1,965	5	5,374	4,926	277	0	10,582	5.39
77	1,341	54	1,940	1,144	99	0	3,237	2.41
78	4,149	0	1,851	2,474	828	6	5,159	1.24
79	11,218	58	18,406	20,164	3,511	0	42,139	3.76
1980	22,505	2	2,915	9,716	415	0	13,048	0.58
81	1,754	0	801	1,161	166	0	2,128	1.21
82	1,135	25	448	1,063	145	0	1,681	1.48
83	3,570	1	8,583	4,239	581	4	13,408	3.76
84	10,491	0	2,597	18,932	2,454		23,983[b]	2.29[b]
1985	7,211	10	1,086	14,654			15,750[b]	2.18[b]
86	1,179	10	720				730[b]	0.62[b]
87	6,066	33					33[b]	0.01[b]
88	4,065							
89	8,318							
1990	6,970							
Average[1]	5,551	8	3,280	8,111	802	2	12,203	2.20
Percent[1]		0	27	66	7	0	100	

[1] Averages and percentages computed from years with complete returns, 1955-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 23. Branch River sockeye salmon escapement and return by brood year, Bristol Bay, 1955-90.[a]

Brood Year	Escapement[1]	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1955	172	0	788	263	44	0	1,095	6.37
56	784	5	1,885	458	41	0	2,389	3.05
57	127	0	5	66	13	1	85	0.67
58	95	0	43	53	52	0	148	1.56
59	825	0	301	387	76	2	766	0.93
1960	1,241	0	105	320	31	0	456	0.37
61	90	10	90	192	0	0	292	3.24
62	91	19	129	94	19	0	261	2.87
63	203	0	200	174	2	0	376	1.85
64	249	5	102	211	17	0	335	1.35
1965	175	6	104	171	17	0	298	1.70
66	174	13	282	274	11	0	580	3.33
67	203	9	301	97	7	0	414	2.04
68	194	8	127	43	3	0	181	0.93
69	182	0	5	160	25	0	190	1.04
1970	177	0	73	77	2	0	152	0.86
71	187	2	26	59	37	2	126	0.67
72	151	1	91	24	14	0	130	0.86
73	35	0	98	148	2	0	248	7.09
74	215	4	297	146	8	0	455	2.12
1975	100	15	415	333	2	0	765	7.65
76	82	26	211	188	55	0	480	5.85
77	100	27	142	699	12	0	880	8.80
78	229	1	102	107	147	0	357	1.56
79	294	3	464	329	3	0	799	2.72
1980	298	0	104	224	11	1	340	1.14
81	82	0	55	223	12	0	290	3.54
82	239	0	173	145	3	0	321	1.34
83	96	0	148	165	3	0	316[b]	3.29[b]
84	215	1	161	188	23		373[b]	1.73[b]
1985	118	3	358	204			565[b]	4.79[b]
86	230	1	346				347[b]	1.51[b]
87	154	0					0[b]	0.00[b]
88	195							
89	197							
1990	169[c]							
Average[2]	244	5	237	201	23	0	466	1.91
Percent[2]	1	51	43	5	0	100		

[1] Tower counts 1955-75. Aerial survey estimates 1976-90.
[2] Averages and percentages computed from years with complete returns, 1955-83.
[a] Includes estimates of False Pass and Japanese high seas catches of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.
[b] Returns incomplete.
[c] Preliminary.

(Sources: 1, 7, and 20)

Appendix Table 24. Naknek River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-90.[a]

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1953	285	0	24	316	248	1	589	2.07
54	799	0	104	2,431	587	16	3,138	3.93
55	279	0	722	1,035	90	6	1,853	6.64
56	1,773	1	474	1,703	321	1	2,500	1.41
57	635	0	55	834	678	3	1,570	2.47
1958	278	0	116	749	172	2	1,039	3.74
59	2,232	0	355	1,093	704	0	2,152	0.96
60	828	1	1,418	1,322	1,279	3	4,023	4.86
61	351	0	242	1,060	642	8	1,952	5.56
62	723	0	80	581	412	1	1,074	1.49
1963	905	0	145	1,223	634	1	2,003	2.21
64	1,350	1	472	1,399	188	1	2,061	1.53
65	718	5	584	1,093	438	1	2,121	2.95
66	1,016	5	731	2,471	630	1	3,838	3.78
67	756	0	334	1,026	356	1	1,717	2.27
1968	1,023	3	152	317	271	2	745	0.73
69	1,331	0	50	1,283	1,214	3	2,550	1.92
70	733	1	173	2,163	382	0	2,719	3.71
71	936	1	422	1,987	1,847	17	4,274	4.57
72	587	3	248	402	611	1	1,265	2.16
1973	357	0	494	1,143	598	0	2,235	6.26
74	1,241	2	234	1,254	911	5	2,406	1.94
75	2,027	1	436	3,090	1,707	8	5,242	2.59
76	1,321	4	1,091	5,572	1,513	29	8,209	6.21
77	1,086	12	642	2,368	465	6	3,493	3.22
1978	813	1	334	2,816	542	0	3,693	4.54
79	925	4	2,443	1,765	423	3	4,638	5.01
80	2,645	1	737	2,695	837	2	4,272	1.62
81	1,796	4	791	3,038	946	3	4,782	2.66
82	1,156	3	188	1,358	484	9	2,042	1.77
1983	888	0	170	827	487	1	1,485[b]	1.67[b]
84	1,242	1	495	2,132	1,825		4,453[b]	3.59[b]
85	1,850	2	684	4,808			5,494[b]	2.97[b]
86	1,979	3	2,008				2,011[b]	1.02[b]
87	1,062	3					3[b]	0.00[b]
1988	1,038							
89	1,162							
90	2,093							
Average[1]	1,026	2	466	1,626	665	4	2,764	2.69
Percent[1]		0	17	59	24	0	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 25. Egegik River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-90.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1953	519	0	26	475	591	12	1,104	2.13
54	507	0	15	1,202	728	45	1,990	3.93
55	271	1	21	835	402	7	1,266	4.67
56	1,104	6	2,026	4,110	687	12	6,841	6.20
57	391	0	37	1,139	996	62	2,234	5.71
1958	246	0	45	890	324	3	1,262	5.13
59	1,072	0	75	1,201	481	25	1,782	1.66
60	1,799	8	469	4,775	2,609	51	7,912	4.40
61	702	0	85	675	819	10	1,589	2.26
62	1,027	0	22	1,019	403	30	1,474	1.44
1963	998	0	18	652	581	7	1,258	1.26
64	850	1	132	1,524	315	12	1,984	2.33
65	1,445	0	139	2,088	854	21	3,102	2.15
66	804	0	251	1,352	898	10	2,511	3.12
67	637	0	64	922	624	3	1,613	2.53
1968	339	0	41	143	260	14	458	1.35
69	1,016	0	13	1,208	1,418	115	2,754	2.71
70	920	0	59	885	270	25	1,239	1.35
71	634	0	46	1,586	1,044	56	2,732	4.31
72	546	0	60	1,570	1,311	18	2,959	5.42
1973	329	0	76	713	887	4	1,680	5.11
74	1,276	0	149	2,324	626	3	3,102	2.43
75	1,174	0	158	2,683	842	3	3,686	3.14
76	509	2	676	3,779	850	0	5,307	10.43
77	693	2	824	2,657	721	13	4,217	6.09
1978	896	0	406	6,581	2,209	12	9,208	10.28
79	1,032	3	721	3,558	1,664	0	5,946	5.76
80	1,061	1	843	6,800	952	0	8,596	8.10
81	695	0	615	4,349	1,465	7	6,436	9.26
82	1,035	4	1,029	3,687	1,646	4	6,370	6.15
1983	792	3	1,763	5,957	2,801	38	10,562	13.34
84	1,165	1	696	7,371	5,063		13,131[b]	11.27[b]
85	1,095	4	596	5,638			6,238[b]	5.70[b]
86	1,151	2	1,870				1,872[b]	1.63[b]
87	1,274	2					2[b]	0.00[b]
1988	1,613							
89	1,612							
90	2,192							
Average[1]	817	1	352	2,301	977	20	3,651	4.47
Percent[1]		0	10	63	27	1	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. Escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 26. Ugashik River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-90.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1953	1,056	0	216	668	224	0	1,108	1.05
54	459	0	28	423	61	0	512	1.12
55	77	0	19	151	7	0	177	2.30
56	425	13	3,167	916	37	0	4,133	9.72
57	215	0	38	459	105	2	604	2.81
1958	280	0	64	549	66	0	679	2.43
59	219	0	18	347	132	1	498	2.27
60	2,341	0	685	1,859	487	1	3,032	1.30
61	366	0	245	747	121	0	1,113	3.04
62	274	0	81	315	28	0	424	1.55
1963	397	0	13	112	23	0	148	0.37
64	483	0	41	262	19	2	324	0.67
65	998	0	87	287	164	0	538	0.54
66	715	1	725	1,568	22	0	2,316	3.24
67	244	0	56	94	34	0	184	0.75
1968	71	0	14	22	3	0	39	0.55
69	160	0	4	58	28	2	92	0.58
70	735	0	5	258	30	1	294	0.40
71	530	0	178	511	131	1	821	1.55
72	79	0	34	177	37	3	251	3.18
1973	39	0	17	22	50	0	89	2.28
74	62	0	20	615	97	0	732	11.81
75	429	3	1,483	2,270	340	1	4,097	9.55
76	356	0	2,088	2,754	438	3	5,283	14.84
77	202	2	603	1,859	202	5	2,671	13.22
1978	82	0	255	1,276	528	0	2,059	25.11
79	1,707	19	3,083	2,304	575	5	5,986	3.51
80	3,335	1	1,225	5,674	850	2	7,752	2.32
81	1,328	2	1,615	4,837	930	1	7,385	5.56
82	1,186	1	432	1,308	745	2	2,488	2.10
1983	1,001	0	657	974	325	1	1,957[b]	1.96[b]
84	1,270	0	530	4,211	716		5,457[b]	4.30[b]
85	1,006	2	514	1,683			2,199[b]	2.19[b]
86	1,015	5	549				554[b]	0.55[b]
87	687	7					7[b]	0.01[b]
1988	654							
89	1,713							
90	749							
Average[1]	640	1	555	1,086	221	1	1,864	2.91
Percent[1]		0	30	58	12	0	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 27. Wood River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-90.[a]

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1953	516	0	301	471	36	1	809	1.57
54	571	0	1,237	1,225	67	0	2,529	4.43
55	1,383	0	2,407	1,235	147	0	3,789	2.74
56	773	0	822	650	0	0	1,472	1.90
57	289	0	177	291	0	0	468	1.62
1958	960	1	2,146	463	32	0	2,642	2.75
59	2,209	0	988	757	56	2	1,803	0.82
60	1,016	6	1,474	1,146	108	0	2,734	2.69
61	461	0	266	1,209	21	1	1,497	3.25
62	874	2	994	459	49	0	1,504	1.72
1963	721	0	537	844	46	0	1,427	1.98
64	1,076	1	458	685	74	2	1,220	1.13
65	675	3	481	1,089	213	1	1,787	2.65
66	1,209	7	1,004	1,034	76	1	2,122	1.76
67	516	3	663	344	82	0	1,092	2.12
1968	649	1	514	570	23	0	1,108	1.71
69	604	0	61	646	126	0	833	1.38
70	1,162	2	1,539	1,235	26	0	2,802	2.41
71	851	3	475	774	50	0	1,302	1.53
72	431	4	801	663	46	0	1,514	3.51
1973	330	2	213	1,223	48	0	1,486	4.50
74	1,709	3	2,965	2,119	90	0	5,177	3.03
75	1,270	60	1,606	2,328	765	0	4,759	3.75
76	817	3	2,290	3,129	275	0	5,697	6.97
77	562	20	1,028	2,213	28	0	3,289	5.85
1978	2,267	0	1,367	1,813	108	0	3,288	1.45
79	1,706	10	2,643	1,514	14	0	4,181	2.45
80	2,969	0	453	1,050	102	0	1,605	0.54
81	1,233	0	626	1,197	86	0	1,909	1.55
82	976	4	522	886	26	0	1,438	1.47
1983	1,361	1	1,945	1,171	77	0	3,194	2.35
84	1,003	0	586	1,393	37		2,016[b]	2.01[b]
85	939	10	1,155	1,448			2,613[b]	2.78[b]
86	819	9	1,241				1,250[b]	1.53[b]
87	1,337	26					26[b]	0.02[b]
1988	867							
89	1,186							
90	1,069							
Average[1]	1,037	4	1,065	1,111	93	0	2,273	2.19
Percent[1]		0	47	49	4	0	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 28. Igushik River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-90.[a]

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1953	100	0	98	20	68	1	187	1.87
54	80	0	175	473	113	1	762	9.53
55	500	0	454	896	94	0	1,444	2.89
56	400	0	169	534	39	0	742	1.86
57	130	0	2	54	20	0	76	0.58
1958	107	0	15	91	28	0	134	1.25
59	644	0	101	248	22	0	371	0.58
60	495	0	62	355	57	0	474	0.96
61	294	0	34	386	17	0	437	1.49
62	16	0	28	290	9	0	327	20.44
1963	92	0	257	225	25	0	507	5.51
64	129	0	163	718	49	0	930	7.21
65	181	0	371	638	79	0	1,088	6.01
66	206	0	66	390	15	0	471	2.29
67	282	0	59	103	12	0	174	0.62
1968	195	0	43	121	12	0	176	0.90
69	512	0	1	432	104	0	537	1.05
70	371	0	27	211	71	0	309	0.83
71	211	0	48	225	30	0	303	1.44
72	60	0	93	115	21	0	229	3.82
1973	60	0	19	676	30	0	725	12.08
74	359	0	449	1,096	35	0	1,580	4.40
75	241	0	783	2,622	525	0	3,930	16.31
76	186	0	556	1,587	235	0	2,378	12.78
77	96	0	300	1,697	17	0	2,014	20.98
1978	536	0	96	414	17	0	527	0.98
79	860	0	423	419	5	0	847	0.98
80	1,988	0	20	296	56	0	372	0.19
81	591	0	188	787	50	0	1,025	1.73
82	424	0	64	443	12	0	519	1.22
1983	180	1	151	361	31	0	544[b]	3.02[b]
84	185	0	41	708	39		788[b]	4.26[b]
85	212	0	530	1,018			1,548[b]	7.30[b]
86	308	3	253				256[b]	0.83[b]
87	169	2					2[b]	0.01[b]
1988	170							
89	462							
90	366							
Average[1]	340	0	171	546	61	0	779	2.29
Percent[1]		0	22	70	8	0	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 29. Nuyakuk River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-88.[a]

Brood Year	Escapement	Return by Year						Return Per Spawner
		3	4	5	6	7	Total	
1953	189	0	55	433	1	0	489	2.59
54	29	0	53	27	0	0	80	2.76
55	16	0	52	20	0	0	72	4.50
56	30	0	217	162	0	0	379	12.63
57	67	0	4	13	1	0	18	0.27
1958	196	0	93	338	11	0	442	2.26
59	49	0	71	60	9	0	140	2.86
60	146	5	154	403	12	0	574	3.93
61	80	1	74	319	1	0	395	4.94
62	38	0	21	37	2	0	60	1.58
1963	167	0	29	197	6	0	232	1.39
64	103	2	18	65	2	0	87	0.84
65	203	0	79	639	61	0	779	3.84
66	161	1	123	531	7	0	662	4.11
67	20	1	11	64	7	0	83	4.15
1968	97	0	20	211	7	0	238	2.45
69	70	2	27	95	9	0	133	1.90
70	365	0	99	877	93	0	1,069	2.93
71	224	1	104	813	41	1	960	4.29
72	29	0	59	309	167	0	535	18.45
1973	110	0	50	1,104	2	0	1,156	10.51
74	155	0	117	256	0	0	373	2.41
75	670	7	531	4,496	256	1	5,291	7.90
76	425	4	436	2,963	276	0	3,679	8.66
77	233	0	341	1,943	109	0	2,393	10.27
1978	577	0	100	807	6	1	914	1.58
79	360	1	531	860	19	0	1,411	3.92
80	3,027	3	84	507	159	0	753	0.25
81	834	0	202	1,480	42	0	1,724	2.07
82	538	14	181	350	15	0	560	1.04
1983	319	7	224	568	0	0	799	2.50
84	473	0	67	0	0		67[b]	0.14[b]
85	429	12	0				12[b]	0.03[b]
86	822	0	0				0[b]	0.00[b]
87[c]	388	0					0[b]	0.00[b]
1988	320							
Average[1]	307	2	134	676	43	0	854	2.78
Percent[1]		0	16	79	5	0	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

[c] Includes Nushagak-Mulchatna fish; Nuyakuk River escapement count incomplete in 1987.

(Sources: 1, 7, and 20)

Appendix Table 30. Togiak River sockeye salmon escapement and return by brood year, Bristol Bay, 1953-90.[a]

Brood Year	Escapement	Return by Year 3	4	5	6	7	Total	Return Per Spawner
1953	102	0	33	93	16	2	144	1.41
54	77	0	20	157	17	0	194	2.52
55	112	0	136	195	39	0	370	3.30
56	225	0	107	328	14	0	449	2.00
57	25	2	58	90	37	0	187	7.48
1958	72	2	71	173	25	0	271	3.76
59	210	0	142	147	7	0	296	1.41
60	192	0	194	299	52	0	545	2.84
61	122	1	88	231	20	0	340	2.79
62	62	0	55	107	8	0	170	2.74
1963	116	0	44	84	24	0	152	1.31
64	105	0	44	125	6	0	175	1.67
65	96	0	156	212	37	0	405	4.22
66	104	1	205	424	11	1	642	6.17
67	81	1	24	115	41	0	181	2.23
1968	50	0	50	196	16	0	262	5.24
69	117	0	33	167	16	0	216	1.85
70	203	0	55	282	71	1	409	2.01
71	200	0	111	379	69	2	561	2.81
72	79	1	95	172	101	0	369	4.67
1973	107	1	161	409	15	0	586	5.48
74	104	0	258	343	56	3	660	6.35
75	181	0	258	912	60	0	1,230	6.80
76	189	0	191	676	166	0	1,033	5.47
77	163	0	256	650	15	0	921	5.65
1978	306	1	154	500	26	0	681	2.23
79	198	2	267	416	7	0	692	3.49
80	527	0	51	310	11	0	372	0.71
81	307	0	61	299	16	0	376	1.22
82	289	0	96	257	31	0	384	1.33
1983	213	0	267	936	23	0	1,226	5.76
84	151	0	36	113	21		170[b]	1.13[b]
85	145	0	43	254			297[b]	2.05[b]
86	203	0	111				111[b]	0.55[b]
87	278	0					0[b]	0.00[b]
1988	305							
89	104							
90	189							
Average[1]	159	0	121	312	34	0	468	2.94
Percent[1]		0	26	67	7	0	100	

[1] Averages and percentages computed from years with complete returns, 1953-83.

[a] Includes estimates of False Pass and Japanese high seas catch of Bristol Bay sockeye. All escapements and returns are rounded to the nearest thousand fish.

[b] Returns incomplete.

(Sources: 1, 7, and 20)

Appendix Table 31. Inshore commercial catch and escapement of chinook salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1971-90.[a]

Year	Nushagak District			Togiak District		
	Catch	Escapement[1]	Total Run	Catch	Escapement[2]	Total Run
1971	82,769	40,000	122,769	27,026	20,000	47,026
72	46,045	25,000	71,045	19,976	14,000	33,976
73	30,470	35,000	65,470	10,856	11,000	21,856
74	32,053	70,000	102,053	10,798	15,000	25,798
75	21,454	70,000	91,454	7,226	11,000	18,226
1976	60,684	100,000	160,684	29,744	14,000	43,744
77	85,074	65,000	150,074	35,218	20,000	55,218
78	118,548	130,000	248,548	57,000	40,000	97,000
79	157,321	95,000	252,321	30,022	20,000	50,022
80	64,958	141,000	205,958	12,543	12,000	24,543
1981	193,461	150,000	343,461	23,911	27,000	50,911
82	195,287	147,000	342,287	33,786	17,000	50,786
83	137,123	162,000	299,123	38,497	22,000	60,497
84	61,378	81,000	142,378	22,179	26,000	48,179
85	67,783	116,000	183,783	37,106	14,000	51,106
1986	65,783	43,434	109,217	19,880	8,000[b]	27,880
87	45,983	84,309	130,292	17,217	11,000	28,217
88	16,501[c]	56,905	73,406	15,615[c]	10,000	25,615
89	17,887[c]	78,302	96,189	11,604[c]	10,739	22,343
90	14,092[c]	63,955	78,047	12,241[c]	9,107	21,348
20-Year Ave.	75,733	87,695	163,428	23,622	16,592	40,215
1971-80 Ave.	69,938	77,100	147,038	24,041	17,700	41,741
1981-90 Ave.	81,528	98,291	179,818	23,204	15,485	38,688

[1] Escapements were estimated from the following:
1971 - mean exploitation rates from 1966-70 and 1972-76.
1972-81 - comprehensive aerial surveys.
1982-85 - correlation between index counts and total escapement estimates when aerial surveys were complete.
1986-90 - sonar estimate.
Estimates for 1971-85 are rounded to the nearest thousand fish.

[2] Escapement estimates based on comprehensive aerial surveys.
Estimates for 1971-88 are rounded to the nearest thousand fish.

[a] Escapement estimates supersede those previously reported.

[b] Minimal estimate based on incomplete data.

[c] Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 32. Inshore commercial catch and escapement of chum salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1971-90.[a]

Year	Nushagak District			Togiak District		
	Catch	Escapement[1]	Total Run	Catch	Escapement[2]	Total Run
1971	360,015	226,000	586,015	123,847	229,000	352,847
72	310,126	195,000	505,126	178,885	170,000	348,885
73	336,331	200,000	536,331	195,431	163,000	358,431
74	157,941	100,000	257,941	80,710	161,000	241,710
75	152,891	80,000	232,891	87,058	114,000	201,058
1976	801,064	500,000	1,301,064	153,559	392,000	545,559
77	899,701	609,000	1,508,701	270,649	496,000	766,649
78	651,743	293,000	944,743	274,967	396,000	670,967
79	440,279	166,000	606,279	219,942	293,000	512,942
80	681,930	969,000	1,650,930	299,682	415,000	714,682
1981	795,143	177,000	972,143	229,886	331,000	560,886
82	434,817	256,000	690,817	151,000	86,000	237,000
83	725,060	164,000	889,060	322,691	165,000	487,691
84	850,114	362,000	1,212,114	336,660	204,000	540,660
85	396,740	288,000	684,740	203,302	212,000	415,302
1986	488,375	168,275	656,650	270,057	330,000	600,057
87	416,476	147,433	563,909	419,425	361,000	780,425
88	370,224[b]	186,418	556,642	470,721[b]	412,000	882,721
89	446,155[b]	377,512	823,667	203,054[b]	143,890	346,944
90	306,452[b]	329,793	636,245	115,711[b]	67,460[b]	183,171
20-Year Ave.	501,079	289,722	790,800	230,362	257,068	487,429
1971-80 Ave.	479,202	333,800	813,002	188,473	282,900	471,373
1981-90 Ave.	522,956	245,643	768,599	272,251	231,235	503,486

[1] Escapements were estimated from the following:
1971-72 - average catch/escapement ratio for 1968-69 and 1973-81;
1973-74 - tower enumeration and aerial survey data;
1975-78 - aerial survey data;
1979-90 - adjusted sonar estimate from Portage Creek site.
Estimates for 1971-85 are rounded to the nearest thousand fish.

[2] Escapement estimates based on aerial surveys; however, surveys were not conducted in 1986 due to budget constraints. Estimate based on catch/escapment proportion using most recent 10-year average data. Estimates for 1971-88 rounded to the nearest thousand fish.

[a] Escapement estimates supersede those previously reported.

[b] Preliminary.

(Sources: 1, 5 and 13)

Appendix Table 33. Escapement and inshore return of chinook salmon by brood year, in thousands of fish, in the Nushagak District, Bristol Bay, 1966-90.[a]

Brood Year	Escapement[2]	Return by Year[1] 1.1	1.2	1.3	1.4	1.5	Total Return[3]	Return per Spawner
1966	40[b]	0	14	27	39	5	99	2.48
67	65[c]	0	10	16	46	25	100	1.54
68	70	0	13	18	68	8	110	1.57
69	35	0	1	15	29	2	49	1.40
1970	50[d]	0	1	57	74	4	139	2.77
71	40	0	2	56	94	13	174	4.35
72	25	0	33	52	125	7	229	9.15
73	35	0	2	82	106	13	203	5.79
74	70	0	24	42	51	2	125	1.78
1975	70	1	95	146	137	10	399	5.70
76	100	2	8	111	143	6	280	2.80
77	65	0	96	152	207	15	473	7.27
78	130	2	27	46	56	22	154	1.18
79	95	3	49	70	87	12	221	2.33
1980	141	0	11	48	56	3	119	0.84
81	150	1	34	47	85	8	175	1.17
82	147	1	4	37	34	6	82	0.56
83	162	0	17	21	53	1	92	0.57
84	81	1	17	28	22			
1985	116	3	18	37				
86	43	0	27					
87	84	1						
88	57							
89	78							
1990	64							
Average[4]	81	1	23	54	75	8	174	2.96
Percent		0	13	31	43	5	92	

1 Escapement age composition for 1966-1980 and 1986 estimated from commercial catch age composition. Subsistence catch age composition from 1966-1981 and 1990 estimated from commercial catch age composition.

2 Escapements for 1968-1970 and 1972-1981 were estimated from comprehensive aerial surveys. Escapements for 1982-1985 were estimated from the correlation between index counts and total escapement when aerial surveys were complete. Escapements for 1986-1990 from sonar estimates.

3 Total return estimates include all age classes, not just 1.1, 1.2, 1.3, 1.4, and 1.5.

4 Mean escapement and return by age class calculated from all escapements and returns from 1966-1990. Mean total return and return per spawner calculated form 1963-1990.

a Estimates of inshore return include estimates of escapement, commercial catch, and subsistence catch.

b Escapement for 1966 estimated from a counting tower on the Nushagak River. Tower counts expanded to account for the proportion of the total escapement not included in the tower count.

c Escapement for 1967 estimated from a combination of tower counts, minimal aerial surveys, and run strength.

d Escapement for 1971 estimated from average mean exploitation rates 1960-1970 and 1972-1976.

(Sources: 1 and 13)

Appendix Table 34. Inshore commercial catch and escapement of pink salmon in the Nushagak District, by river system, in numbers of fish, Bristol Bay, 1958-90.[a]

Year	Catch	Escapement							Total Run
		Wood[1]	Igushik[2]	Nuyakuk[3]	Nush/Mul[4]	Nushagak[5]	Snake[6]	Total	
1958	1,113,794			4,000,000				4,000,000	5,113,794
60	289,781			146,359				146,359	436,140
62	880,424	25,000	12,000	493,914	6,100		6,000	543,014	1,423,438
64	1,497,817	1,560	450	883,500	25,000		50	910,560	2,408,377
66	2,337,066			1,442,424				1,442,424	3,779,490
1968	1,705,150			2,161,116				2,161,116	3,866,266
70	417,834			152,580				152,580	570,414
72	67,953			58,536				58,536	126,489
74	413,613	44,800	7,500	529,216	3,100		900	585,516	999,129
76	739,580	21,986	5,070	794,478	41,800		100	863,434	1,603,014
1978	4,348,336	205,000	16,210	8,390,184	771,600		3,483	9,386,477	13,734,813
80	2,202,545	31,150	3,500	2,626,746	123,000		800	2,785,196	4,987,741
82	1,339,272	36,100	8,430	1,592,096	19,130		900	1,656,656	2,995,928
84	3,127,153	81,400	6,190	2,760,312	73,050		5,500	2,926,452	6,053,605
86	267,117					72,189		72,189	339,306
1988	248,656[b]					494,610[b]		494,610	743,266
90	53,286[b]					801,430[b]		801,430	854,716
17-Year Avg.[7]	1,238,199	55,875	7,419	1,859,390	132,848	456,076	2,217	1,705,091	2,943,290

1 Aerial survey estimate 1962 and 1974-84; tower count 1964.
2 Aerial survey estimate 1962-80; aerial survey estimate and tower count 1976 and 1982-84.
3 Tower count 1960-84; aerial survey estimate 1958, and below counting tower 1962-64 and 1974-84.
4 Aerial survey estimate.
5 Sonar estimate from Portage Creek; no tower count conducted; Nush/Mul included in the estimate.
6 Aerial survey estimate 1962-64, 1974-76 and 1980-84, and weir count 1978.
7 Only years and systems with escapement data were included in averages.
a Includes even-years only.
b Preliminary.

(Sources: 1, 5, 13, and 20)

Appendix Table 35. Nushagak District pink salmon escapement and return by brood year, in numbers of fish, Bristol Bay, 1958-90.[a]

Brood Year	Escapement	Return	Return Per Spawner
1958	4,000	436	0.11
1960	146	1,423	9.75
62	543	2,408	4.43
64	911	3,779	4.15
66	1,442	3,866	2.68
68	2,161	570	0.26
1970	153	126	0.82
72	59	999	16.93
74	586	1,603	2.74
76	863	13,735	15.92
78	9,386	4,988	0.53
1980	2,785	2,996	1.08
82	1,657	6,054	3.65
84	2,926	339	0.12
86	72	743[b]	10.32
88	495	855[b]	1.73
1990	801[b]		
17-Year Average	1,705	2,808[c]	4.70[c]

[a] Includes even-years only. All escapements and returns are reported to the nearest thousand fish.
[b] Preliminary.
[c] Average computed from 1958-88.

(Sources: 1, 5, 13 and 20)

Appendix Table 36. Inshore commercial catch and escapement of coho salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1980-90.[a]

	Nushagak District			Togiak District		
Year	Catch	Escapement[1]	Total Run	Catch	Escapement	Total Run
1980	147,726	232,000	379,726	151,000	96,000[c]	247,000
81	220,290	180,000[b]	400,290	29,207	61,000[d]	90,207
82	349,669	234,000	583,669	133,765	81,000[c]	214,765
83	81,338	51,000	132,338	5,711	12,000[e]	17,711
84	260,310	171,000	431,310	176,053	104,000[f]	280,053
1985	20,230	89,500	109,730	38,636	61,300[g]	99,936
86	68,568	42,772	111,340	48,306	30,200[c]	78,506
87	13,263	20,220	33,483	1,292	64,900[i]	66,192
88[h]	53,125	131,101	184,226	18,595	86,330[j]	104,925
89[h]	77,073	84,707	161,780	57,300	[k]	
1990[h]	7,447	162,853[l]	170,300	2,719	67,449[j]	70,168
11-Year Ave.	118,094	127,196	245,290	60,235	66,418	126,946

[1] Sonar enumeration has not always covered the complete season; in these cases a proportional method was used to estimate escapement after the sonar operation terminated.

[a] Escapement estimates based on data collected from sonar enumeration and on aerial surveys of the spawning grounds; these escapement estimates supersede previously reported escapements.

[b] Sonar enumeration precluded by lack of funding; escapement was estimated from mean exploitation rates from 1980 and 1982-84.

[c] Includes Togiak and Kulukak River drainages.

[d] Includes Togiak, Kulukak, Ungalikthluk/Kukayachagak and Nunavachak drainages.

[e] Aerial escapement precluded by adverse weather and water conditions; estimate based on exploitation rate.

[f] Togiak, Kulukak, Slug, Osviak, and Matogak River drainages.

[g] Togiak, Kulukak, Quigmy, Matogak, and Osviak drainages.

[h] Preliminary.

[i] Estimate of Togiak River drainage derived from sonar enumeration (USFWS) in conjunction with aerial surveys of Kulukak, Osviak, Matogak, Quigmy, and Ungalikthluk drainages.

[j] Togiak, Kulukak, Slug, Osviak, Matogak, Quigmy, Negukthlik, and Ungalikthluk.

[k] No escapement estimate available due to adverse weather and water conditions.

[l] Special funding enabled the sonar project to operate until 9/12.

(Sources: 1, 5 and 13)

Appendix Table 37. Average round weight of the commercial salmon catch by district and species, in pounds, Bristol Bay, 1971-90.[a]

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Average Bristol Bay
			SOCKEYE SALMON			
1971	5.6	5.9		6.2	7.0	6.0
72	6.1	6.0	6.1	6.0	6.4	6.0
73	6.7	7.1	7.3	7.1	7.9	7.1
74	5.5	5.7	5.2	5.7	7.0	5.8
75	5.2	5.7	5.2	6.1	6.7	5.5
1976	5.8	5.9	6.2	6.6	7.5	6.1
77	6.6	6.3	6.8	7.5	7.9	6.7
78	5.5	6.3	6.2	6.3	7.3	5.9
79	5.8	6.0	6.0	6.1	7.2	5.9
80	5.4	5.6	5.5	6.1	6.8	5.6
1981	6.1	6.0	6.3	6.4	6.8	6.2
82	6.3	6.4	6.5	6.4	7.4	6.4
83	5.5	5.8	5.7	5.9	6.7	5.7
84	5.4	5.8	5.6	6.2	6.8	5.6
85	5.6	5.8	5.8	5.9	6.5	5.8
1986	6.1	5.9	6.1	5.9	6.7	6.0
87	5.8	5.9	6.1	6.0	6.9	6.0
88	6.0	6.2	6.2	6.2	7.4	6.2
89	5.5	5.7	5.6	6.0	6.6	5.6
90	5.7	5.7	5.8	5.7	6.6	5.7
			CHINOOK SALMON			
1971	27.0	21.7		21.7	22.3	22.1
72	25.5	21.6	17.3	19.8	21.1	20.3
73	23.5	21.4	21.0	22.6	24.1	23.0
74	20.8	18.6	20.7	23.2	21.0	22.4
75	25.0	19.5	18.1	18.8	14.0	17.8
1976	27.6	18.6	13.5	18.7	12.1	17.0
77	30.5	22.1	23.8	23.4	20.8	22.9
78	28.3	23.6	29.2	22.3	26.1	23.9
79	21.8	21.2	22.7	21.1	22.2	21.3
80	20.5	21.0	21.9	19.6	18.0	19.7
1981	20.8	18.6	18.9	19.6	13.1	19.0
82	19.4	18.5	20.1	20.4	15.4	19.6
83	20.8	20.2	21.5	21.0	20.7	20.9
84	20.0	18.7	19.5	20.8	20.3	20.5
85	19.0	17.3	19.1	16.9	19.3	17.9
1986	15.6	16.8	18.6	19.9	16.3	18.8
87	23.2	20.0	20.2	19.7	19.4	20.5
88	20.4	21.5	20.6	18.2	17.7	18.7
89	22.3	19.2	17.9	18.0	19.1	19.1
90	16.1	15.3	16.6	17.4	16.9	16.9
			CHUM SALMON			
1971	6.5			6.4	6.7	6.5
72	6.5	6.4	5.7	6.5	6.6	6.5
73	7.3	6.9	7.7	7.0	7.3	7.1
74	6.4	6.4	7.2	6.2	7.4	6.6
75	6.3	6.2	6.1	6.1	6.6	6.3

-continued-

Appendix Table 37. (Page 2 of 2)

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Average Bristol Bay
1976	5.9	5.8		6.9	7.1	6.8
77	7.3	6.5	6.7	7.3	8.2	7.4
78	6.6	6.7	6.2	7.1	8.1	7.2
79	6.8	7.2	7.5	6.2	7.8	6.8
80	6.2	6.6	6.3	5.9	6.7	6.2
1981	6.5	6.8	7.2	6.6	7.4	6.7
82	6.3	6.6	6.8	6.7	7.3	6.7
83	6.1	6.7	6.3	6.4	7.6	6.6
84	6.4	6.9	6.5	6.5	7.8	6.8
85	6.6	6.6	6.8	6.3	7.5	6.8
1986	6.5	6.2	6.6	6.5	7.4	6.7
87	6.0	6.1	6.4	6.4	7.4	6.5
88	6.0	6.5	6.5	6.8	8.1	7.0
89	5.9	6.2	6.2	6.0	7.6	6.3
90	6.1	6.1	6.0	5.9	8.0	6.3
			PINK SALMON			
1972	3.4			3.1	3.8	3.1
74	4.3	3.9	4.1	3.6	4.4	4.0
76	3.7	3.8		3.3	4.1	3.4
78	3.6	3.2	3.3	3.1	3.8	3.2
80	3.6	3.4		3.4	3.8	3.4
1982	3.6		4.1	3.5	3.5	3.5
84	3.6	3.8	3.1	3.2	3.8	3.2
86	4.0	3.8	3.4	3.3	3.9	3.5
88	3.7	3.9	3.7	3.4	3.5	3.6
90	3.9	3.6	3.8	3.5	3.5	3.8
			COHO SALMON			
1971				6.3		6.3
72		6.1		6.3	7.6	7.0
73	5.6	6.3	6.8	6.0	7.5	6.7
74	6.7	6.5	7.2	6.7	8.6	7.9
75	6.7	7.2	7.2	6.1	9.2	8.6
1976	5.5	6.9		6.0	8.3	7.6
77				6.5	9.4	7.8
78	6.4	6.3		6.8	8.2	7.5
79	5.2	7.3	8.4	6.7	9.0	7.8
80	6.8	6.8	7.8	6.1	8.0	7.0
1981	6.2	6.3	7.6	6.0	7.8	6.4
82	7.2	7.1	7.7	6.8	8.7	7.3
83		6.7	7.2	6.5	7.1	6.6
84	6.0	6.9	7.7	6.6	8.9	7.5
85	7.0	7.7	7.9	7.3	9.1	8.0
1986	5.5	6.7	7.1	5.9	7.8	6.7
87	6.7	6.8	7.7	6.6	7.1	7.0
88	7.2	8.3	8.3	7.1	7.7	7.8
89	7.5	7.6	7.3	7.0	7.7	7.4
90	6.1	7.7	8.1	6.9	7.7	7.5

[1] Average weight in pounds is weighted by the number of fish reported by each buyer.

(Sources: 4 and 10)

Appendix Table 38. Exvessel value of the commercial salmon catch by species, in thousands of dollars, Bristol Bay, 1971-90.[a]

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1971	14,951	652	528		16	16,147
72	3,914	339	512	47	20	4,832
73	1,892	284	829		115	3,120
74	3,793	460	567	1,053	142	6,015
75	11,047	214	615		151	12,027
1976	17,139	742	2,892	1,093	82	21,948
77	19,434	1,940	4,275		445	26,094
78	40,034	3,206	3,173	5,424	435	52,272
79	128,992	4,541	2,480		2,387	138,400
80	76,118	1,881	2,738	2,173	1,392	84,302
1981	120,907	5,557	4,106		1,461	132,031
82	68,122	6,088	2,145	1,111	3,199	80,665
83	129,900	2,853	3,216		337	136,306
84	94,681	2,158	4,040	2,414	3,072	106,365
85	115,402	2,188	2,218		923	120,731
1986	135,689	1,819	2,522	207	826	141,063
87	130,847	1,912	2,594		314	135,667
88[b]	170,204	874	4,029	1,126	1,754	177,987
89[b]	175,689	629	1,729		1,149	179,196
90[b]	197,114	502	1,668	530	555	200,369
20-Year Ave.	82,793	1,942	2,344	1,518[c]	939	88,777
1970-79 Ave.	31,731	1,426	1,861	1,958[c]	519	36,516
1980-89 Ave.	133,856	2,458	2,827	1,078[c]	1,359	141,038

[a] Value paid to the fishermen. Derived from price per fish or pounds times commercial catch.
[b] Preliminary.
[c] Includes even-years only.

(Sources: 1, 5, 9, and 10)

Appendix Table 39. Salmon case pack by species, Bristol Bay, 1971-90.[a]

Year	Sockeye	Chinook	Chum	Pink[1]	Coho	Total
1971	694,199	23,118	56,852		437	774,606
72	197,495	9,666	53,756	5,002	547	266,466
73	61,429	1,946	42,044		1,456	106,875
74	87,723	6,461	23,789	39,550	7,012	164,535
75	290,646	1,920	22,667		373	315,606
1976	393,698	6,889	104,935	36,616	1,068	543,206
77	353,133	3,119	137,838		2,383	496,473
78	551,648	6,982	76,926	163,230	2,916	801,702
79	688,882	3,058	34,517		1,236	727,693
80	571,347	820	63,616	48,055	3,767	687,605
1981	783,222	5,304	66,430		943	855,899
82	193,321	1,700	17,320	26,789	7,510	246,640
83	800,390	6,178	47,227		705	854,500
84	649,315	1,740	69,026	108,206	9,765	838,052
85	297,884	2,257	18,367		430	318,938
1986	205,015	1,037	11,168	2,024	502	219,746
87	274,130	1,952	21,967			298,049
88	108,503	745	12,880	5,357	310	127,795
89	402,397	1,311	30,286		324	434,318
90	552,194	2,242	41,481	1,754	357	598,028
20-Year Ave.	407,829	4,422	47,655	43,658	2,213	483,837
1971-80 Ave.	389,020	6,398	61,694	58,491	2,120	488,477
1981-90 Ave.	426,637	2,447	33,615	28,826	2,316	479,197

[1] Includes even-years only.

[a] Includes only fish canned in Bristol Bay, in number of cases. Each case contains 48 1-lb. cans.

(Sources: 1, 4, and 17)

Appendix Table 40. Commercial production of frozen salmon by species, in pounds, Bristol Bay, 1971-90.[a]

Year	Sockeye	Chinook	Chum	Pink[1]	Coho	Total
1971	1,812,864	356,422	115,388		40,925	2,325,599
72	54,571	362,653	60,466	790	24,308	502,788
73	186,663	557,422	307,790		98,115	1,149,990
74	147,475	281,821	7,212	113,241	582	550,331
75	101,751	230,045	133,339		444,344	909,479
1976	883,620	570,837	163,030	215,176	117,603	1,950,266
77	586,098	1,155,791	336,283		235,607	2,313,779
78	6,306,661	1,848,951	761,029	1,580,236	145,355	10,642,232
79	38,031,872	2,291,378	1,231,334		1,350,300	42,904,884
80	31,855,642	1,189,870	1,391,797	3,040,765	828,114	38,306,188
1981	49,613,633	2,602,066	1,371,467		1,065,573	54,652,739
82	57,636,789	3,045,713	2,183,075	2,346,198	2,746,413	67,958,188
83	103,432,084	2,723,637	2,372,852		415,890	108,944,463
84	67,355,538	1,256,414	1,898,387	1,939,511	2,219,281	74,669,131
85	91,318,967	1,238,975	2,569,767		467,440	95,595,149
1986	75,010,887	1,421,379	6,130,639	1,175,236	1,072,983	84,811,124
87	63,149,457	1,071,656	5,985,150		86,243	70,292,506
88	73,476,123	718,081	9,420,130	4,517,077	1,215,901	89,347,312
89	109,839,707	587,226	4,691,196		1,368,576	116,486,705
90	129,699,551	415,467	3,772,026	1,517,621	712,714	136,117,379
20-Year Ave.	45,024,998	1,196,290	2,245,118	1,644,585	732,813	50,021,512
1971-80 Ave.	7,996,722	884,519	450,767	990,042	328,525	10,155,554
1981-90 Ave.	82,053,274	1,508,061	4,039,469	2,299,129	1,137,101	89,887,470

[1] Includes even-years only.
[a] Includes only fish processed in Bristol Bay.

(Source: 3)

Appendix Table 41. Commercial production of cured salmon by species, in pounds, Bristol Bay, 1971-90.[a]

Year	Sockeye	Chinook	Chum	Pink[1]	Coho	Total
1971	14,922	148,354	12,778		5,682	181,736
72	10,526	3,959	8,614	32	28,547	51,678
73	23,851	4,617	27,768		17,539	73,775
74	24,977	5,402	2,505	65	4,530	37,479
75	11,863	20,660	81		0	32,604
1976	4,210	62	90	0	0	4,362
77	3	20	90		3,171	3,284
78	680,402	4,664	17,388	97,390	3,410	803,254
79	3,651,146	16,824	136,585		1,000	3,805,555
80	4,242,063	9,603	286,113	9,649	6,653	4,554,081
1981	4,956,561	23,663	148,051		6,526	5,134,801
82	3,222,798	75,752	277,013	12,780	1,466	3,589,809
83	5,045,048	22,259	266,005		595	5,333,907
84	1,608,948	12,200	131,915	8,545	79,540	1,841,148
85	2,059,078	5,344	50,612		0	2,115,034
1986	1,447,014	1,231	42,453	0	2,185	1,492,883
87	648,792	0	526		0	649,318
88	610,377	0	0	0	0	610,377
89	825,638	2,406	18,209		0	846,253
90	928,440	589	3,612	0	0	932,641
20-Year Ave.	1,500,833	17,880	71,520	10,705	8,042	1,604,699
1971-80 Ave.	866,396	21,417	49,201	21,427	7,053	954,781
1981-90 Ave.	2,135,269	14,344	93,840	3,046	9,031	2,254,617

[1] Includes even-years only.
[a] Includes only fish processed in Bristol Bay.

(Source: 3)

Appendix Table 42. Fresh export of salmon by air transportation, by species, in pounds, Bristol Bay, 1971-90.[a]

Year	Sockeye	Chinook	Chum	Pink[1]	Coho	Total
1971	0	232,912	0		0	232,912
72	20,754	359,533	6,442	0	4,837	391,566
73	163,447	326,372	238,851		134,260	862,930
74	253,879	253,695	35,102	104,230	15,116	662,022
75	374,588	128,032	71,744		10,313	584,677
1976	498,014	445,386	213,118	96,038	22,559	1,275,115
77	997,899	1,134,791	961,537		409,058	3,503,285
78	5,149,427	1,548,439	984,408	1,967,420	341,212	9,990,906
79	22,838,654	1,652,904	1,176,549		933,539	26,601,646
80	23,284,065	514,638	617,989	612,276	1,196,502	26,225,470
1981	25,943,037	1,302,979	817,991		800,432	28,864,439
82	20,416,684	2,056,650	1,027,817	166,672	1,576,761	25,244,584
83	26,641,032	978,050	552,536		248,582	28,420,200
84	7,487,073	565,038	713,898	92,837	1,351,689	10,210,535
85	12,282,823	789,267	1,094,089		518,574	14,684,753
1986	3,604,592	286,482	281,327	6,357	104,724	4,283,482
87	2,496,702	272,358	1,128,880		209,799	4,107,739
88	3,378,714	95,093	140,212	890,239	391,562	4,895,820
89	10,883,368	58,966	442,727		271,434	11,656,495
90	20,202,025	55,430	706,893	283,398	31,695	21,279,441
20-Year Ave.	9,345,839	652,851	560,606	421,947	428,632	11,198,901
1971-80 Ave.	5,358,073	659,670	430,574	555,993	306,740	7,033,053
1981-90 Ave.	13,333,605	646,031	690,637	287,901	550,525	15,364,749

[1] Includes even-years only.

[a] Includes all fish exported out of Bristol Bay by air in fresh condition regardless of final processing method.

(Source: 3)

Appendix Table 43. Brine export of salmon by sea-going transportation, Bristol Bay, 1971-90.[a]

Year	Number		Number	Pounds
	Operators	Tenders		
1971	5	12	523,784	3,162,326
72	1	1	59,750	365,386
73	0	0	0	0
74	2	2	78,620	456,430
75	5	20	933,728	5,135,799
1976	5	21	728,420	4,466,126
77	5	15	623,523	3,603,382
78	9	33	1,602,224	9,304,376
79	12	61	2,987,456	17,557,354
80	14	101	4,987,000	27,780,210
1981	18	80	3,300,118	20,512,734
82	8	27	565,891	3,582,904
83	13	85	4,428,741	25,199,944
84	9	55	2,672,519	14,919,944
85	9	26	973,826	5,521,739
1986	4	17	715,646	4,349,044
87	6	27	1,010,438	5,963,716
88	1	3	12,954	82,663
89	7	36	1,806,489	9,551,828
90	16	49	3,041,050	17,543,569
20-Year Ave.	7	34	1,552,609	8,952,974
1971-80 Ave.	6	27	1,252,451	7,183,139
1981-90 Ave.	9	41	1,852,767	10,722,809

[a] Includes mixed species of chinook, sockeye, pink, chum, and coho salmon exported from Bristol Bay for eventual processing. Fish are transported in brine or chilled sea water by tenders.

(Source: 3)

Appendix Table 44. Commercial production and disposition of salmon, in thousands of pounds, Bristol Bay, 1971-90.[a]

Year	Canned		Frozen		Cured		Export				Total
							Fresh		Brine[1]		
	Pounds	%	Pounds	%	Pounds	%	Pounds	%	Pounds	%	
1971	52,514	91	1,813	3	15	0	0	0	3,162	5	57,504
72	14,045	97	55	0	11	0	21	0	365	3	14,497
73	5,030	93	187	3	24	0	163	3	0	0	5,404
74	7,020	89	147	2	25	0	254	3	456	6	7,902
75	21,319	79	102	0	12	0	375	1	5,136	19	26,944
1976	28,426	83	884	3	4	0	498	1	4,466	13	34,278
77	27,495	84	586	2	0	0	988	3	3,603	11	32,672
78	37,136	63	6,307	11	680	1	5,149	9	9,304	16	58,576
79	44,350	35	38,032	30	3,651	3	22,839	18	17,557	14	126,429
80	46,379	35	31,856	24	4,242	3	23,284	17	27,780	21	133,541
1981	57,456	36	49,614	31	4,957	3	25,943	16	20,513	13	158,483
82	11,808	12	57,637	60	3,223	3	20,417	21	3,583	4	96,668
83	54,571	25	103,432	48	5,045	2	26,641	12	25,200	12	214,889
84	46,787	34	67,356	49	1,609	1	7,487	5	14,920	11	138,159
85	23,730	18	91,319	68	2,059	2	12,283	9	5,522	4	134,913
1986	11,536	12	75,011	78	1,447	2	3,605	4	4,349	5	95,948
87	15,191	17	63,149	72	649	1	2,497	3	5,964	7	87,450
88	6,677	8	73,476	87	610	1	3,379	4	83	0	84,225
89	32,574	20	109,840	67	826	1	10,883	7	9,552	6	163,675
90	30,581	15	129,700	65	928	0	20,202	10	17,544	9	198,955
20-Year Ave.	28,731	31	45,025	48	1,501	2	9,345	10	8,953	10	93,556
1971-80 Ave.	28,371	57	7,997	16	866	2	5,358	11	7,183	14	49,775
1981-90 Ave.	29,091	21	82,053	60	2,135	2	13,334	10	10,723	8	137,337

[1] Brine export primarily includes sockeye salmon exported from Bristol Bay, regardless of final processing method. However, some mixed fish are included in some years.

[a] Canned, frozen, cured, and fresh export includes all sockeye exported out of Bristol Bay regardless of final processing method.

(Sources: 1, 3, and 4)

Appendix Table 45. South Unimak and Shumigan Island sockeye and chum salmon preseason quota and actual commercial catch, in thousands of fish, Alaska Peninsula, 1971-90.[a]

	South Unimak			Shumigan Island			Total		
	Sockeye			Sockeye			Sockeye		
Year	Actual	Qouta[1]	Chum	Actual	Qouta[1]	Chum	Actual	Qouta[1]	Chum
1971	565		554	45		115	610		669
72	443		468	76		108	519		576
73	239		189	23		23	262		212
74	60	50	15		25		60	75	15
75	190	165	65	49	50	36	239	215	101
1976	235	350	327	72	75	74	307	425	401
77	193	195	93	46	42	22	239	237	115
78	419	428	105	68	94	18	487	522	123
79	683	900	64	179	200	41	862	1,100	105
80	2,731	2,513	457	572	555	71	3,303	3,068	528
1981	1,474	1,442	521	351	318	54	1,825	1,760	575
82	1,670	1,850	934	451	408	160	2,121	2,258	1,094
83	1,545	1,469	615	416	324	169	1,961	1,793	784
84	1,131	1,111	228	257	245	109	1,388	1,356	337
85	1,495	1,380	345	367	305	134	1,862	1,685	479
1986	314	907	252	156	200	99	470	1,107	351
87	652	635	406	141	140	37	793	775	443
88	474	1,263	465	282	279	62	756	1,542	527
89	1,348	1,199	408	397	264	48	1,745	1,463	456
90	1,091	1,087	455	256	240	64	1,347	1,327	519
20-yr avg.	848		348	221		76	1,058		421
71-80 avg.	576		234	126		56	689		285
81-90 avg.	1,119	1,234	463	307	272	94	1,427	1,507	557

[a] South Unimak includes statistical area 284 in June and July, while Shumigan Islands includes statistical area 282 in June only.

[1] The sockeye quota management system was initiated in 1974, and is based on the final Bristol Bay projected inshore harvest and traditional harvest patterns.

(Source: 12)

Appendix Table 46. Subsistence salmon catch by district and species, Bristol Bay, 1971-90.[a]

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			NAKNEK-KVICHAK DISTRICT				
1971	137	66,400	200			100	53,300
72	170	52,200	400	400	700	100	53,800
73	219	41,600	600	300		500	43,000
74	263	102,600	1,000	1,100	1,600	200	106,500
75	301	122,600	700	300		200	123,800
1976	346	82,200	900	900	1,500	600	86,100
77	352	81,400	1,300	600	100	300	83,700
78	392	93,000	1,200	1,000	1,400	300	96,900
79	424	75,000	1,200	600		1,200	78,000
80	759	88,200	1,500	1,200	2,100	800	93,800
1981	649	85,100	1,000	400	100	1,100	87,700
82	350	71,400	1,100	600	900	1,000	75,000
83	385	107,900	1,000	400	300	900	110,500
84	382	115,200	900	600	1,300	600	118,600
85	544	107,543	1,179	540	27	1,103	110,392
1986	412	77,283	1,295	695	2,007	650	81,930
87	407	86,706	1,289	756	490	1,106	90,347
88	391	88,145	1,057	588	917	813	91,520
89	411	87,103	970	693	277	1,927	90,970
90	466	92,326	985	861	1,032	726	95,930
20-Year Ave.	388	86,195	989	627	1,346[b]	711	88,589
			EGEGIK DISTRICT				
1972	2					100	100
73	3					100	100
74	7	300					300
75	3	200					200
76[c]	2						
1977	20	100		100		200	400
78	13	200		100		200	500
79	8	300				100	400
80	3	100					100
81[c]	4						
1982	19	2,400					2,400
83	14	700					700
84	24	500		100		300	900
85	23	582	14	21	1	203	821
86	41	1,052	69	58	21	319	1,519
1987	49	3,350	87	139	2	284	3,862
88	52	1,405	97	87	54	333	1,976
89	50	1,636	50	33	1	414	2,134
90	61	1,105	53	85	39	331	1,613
19-Year Ave.	21	929	62	80	38[b]	240	1,060

-continued-

Appendix Table 46. (page 2 of 3)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			UGASHIK DISTRICT				
1971	9	300				100	400
72	13	200	100	100		300	700
73	14	200		100		600	900
74	8	200	100			500	800
75	1	700				1,200	1,900
1976	21	1,200	100	100	100	300	1,800
77	19	1,000	100	300		500	1,900
78	8	500	100	100		900	1,600
79	8	200				100	300
80	10	200				200	400
1981	12	600				200	800
82	11	400				300	700
83	8	500				100	600
84	8	500				200	700
85	9	233	17	7		143	400
1986	27	1,080	83	48	21	335	1,567
87	22	892	104	51	29	272	1,348
88	23	1,400	84	55	35	330	1,904
89	22	1,309	32	35	2	214	1,592
90	37	1,578	51	143	120	280	2,172
20-Year Ave.	15	660	79	94	92[b]	354	1,124
			NUSHAGAK DISTRICT				
1971	164	42,400	4,400	4,200		2,300	53,300
72	168	24,100	4,000	8,200	1,200	1,000	38,500
73	216	28,000	6,600	7,600	100	2,200	44,500
74	261	41,200	7,900	10,200	4,300	4,700	68,300
75	340	47,300	7,100	5,600	1,300	4,300	65,600
1976	317	34,700	6,900	7,200	2,700	2,100	53,600
77	306	43,300	5,200	7,300	200	4,500	60,500
78	331	33,200	6,600	14,300	11,100	2,500	67,700
79	364	40,200	8,900	6,800	500	5,200	61,600
80	425	76,800	11,800	11,700	7,600	5,100	113,000
1981	395	44,600	11,500	10,200	2,300	8,700	77,300
82	376	34,700	12,100	11,400	7,300	8,900	74,400
83	389	38,400	11,800	9,200	500	5,200	65,100
84	438	43,200	9,800	10,300	6,600	8,100	78,000
85	406	38,000	7,900	4,000	600	6,100	56,600
1986	424	49,000	12,600	10,000	5,400	9,400	86,400
87	474	40,900	12,200	6,000	200	6,200	65,500
88	441	31,086	10,079	8,234	6,316	5,223	60,938
89	432	34,535	8,122	5,704	407	8,679	57,447
90	441	33,003	12,407	7,808	3,183	5,919	62,320
20-Year Ave.	355	39,931	8,895	8,297	7,710[b]	5,316	70,150

-continued-

Appendix Table 46. (page 3 of 3)

Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
			TOGIAK DISTRICT				
1974	68	7,400	1,200	2,000	500	1,800	12,900
75	41	4,600	800	1,600		2,800	9,800
76	30	2,800	500	900	100	500	4,800
77	41	2,100	400	800		1,100	4,400
78	29	900	300	700	300	500	2,700
1979	25	800	200	300		700	2,000
80	46	3,600	900	300	300	1,200	6,300
81	52	1,900	400	800	100	2,200	5,400
82	50	1,900	400	300	400	1,300	4,300
83	38	1,900	700	900	200	800	4,500
1984	41	3,600	600	1,700	500	3,800	10,200
85	51	3,400	600	1,000	100	1,500	6,600
86	29	2,400	700	800	100	500	4,500
87	46	3,600	700	1,000		1,600	6,900
88	29	2,413	429	716	45	792	4,395
1989	40	2,825	551	891	112	976	5,355
90	37	3,689	480	786	60	1,111	6,126
17-Year Ave.	41	2,931	580	911	256[b]	1,363	5,952
			TOTAL BRISTOL BAY				
1971	310	109,100	4,600	4,200		2,500	120,400
72	353	76,500	4,500	8,700	1,900	1,400	93,000
73	452	69,800	7,200	8,000	100	3,300	88,400
74	607	151,700	10,200	13,300	6,400	7,200	188,800
75	686	175,400	8,600	7,500	1,300	8,500	201,300
1976	716	120,900	8,400	9,100	4,400	3,500	146,300
77	738	127,900	7,000	9,100	300	6,600	150,900
78	773	127,600	8,100	16,200	12,700	4,400	169,000
79	829	116,500	10,300	7,700	500	7,300	142,300
80	1,243	168,600	14,100	13,100	10,000	7,300	213,100
1981	1,112	132,100	13,000	11,500	2,600	12,200	171,400
82	806	110,800	13,700	12,400	8,600	11,500	157,000
83	834	149,400	13,500	10,500	900	7,100	181,400
84	893	163,000	11,300	12,700	8,400	13,000	208,400
85	1,033	149,758	9,710	5,568	728	9,049	174,813
1986	933	130,815	14,747	11,601	7,549	11,204	175,916
87	998	135,493	14,356	7,895	689	9,453	167,886
88	936	124,449	11,746	9,680	7,367	7,491	160,733
89	955	127,408	9,725	7,356	799	12,210	157,498
90	1,042	131,701	13,976	9,683	4,434	8,367	168,161
20-Year Ave.	800	129,854	10,252	9,795	7,175[b]	7,642	161,502
1971-80 Ave.	671	124,400	8,300	9,690	7,080[b]	5,200	151,350
1981-90 Ave.	954	135,492	12,576	9,888	7,270[b]	10,157	172,321

[a] Permit and catch estimates prior to 1989 are based on where permit was issued; estimates from 1989 to present are based on area the permit was fished, as initially recorded on the permit.
[b] Catches prior to 1985 rounded to the nearest hundred fish.
[c] Includes even-years only.
No permits returned.
(Sources: 1 and 8).

Appendix Table 47. Subsistence catch of sockeye salmon by village area, in numbers of fish, Kvichak River drainage, Bristol Bay, 1971-90.[a]

Year	Levelock	Igiugig	Pedro Bay	Kokhanok	Iliamna-Newhalen	Nondalton	Port Alsworth	Other[1]	Total
1971	1,600[b]	6,500	10,100	12,800	8,500	22,100			61,600
72	1,600[b]	2,200	4,000	8,300	10,000	24,100			50,200
73	4,800	2,200	2,900	9,200	10,200	8,500	1,300		39,100
74	8,600	6,200	14,400	21,500	16,400	29,500	1,500		98,100
75	5,300	6,400	8,300	18,000	26,700	48,700	2,100		115,500
1976	5,300	6,800	4,400	17,100	16,300	20,500	5,500		75,900
77	2,600	6,000	5,600	14,300	11,400	27,200	4,900		72,000
78	8,900	8,800	11,200	23,700	11,000	17,300	3,000		83,900
79	4,400	6,600	3,500	16,200	15,900	14,700	4,200		65,500
80	6,100	8,100	7,400	22,600	11,100	11,300	6,000		72,600
1981	6,600	5,400	9,700	16,500	15,400	15,200	6,800		75,600
82	5,400	1,900	8,200	16,600	13,500	11,200	4,500		61,300
83	4,800	3,300	10,400	20,100	23,800	29,400	4,700		96,500
84	8,100	6,300	12,100	24,400	15,900	29,100	4,600		100,500
85	6,600	3,400	12,900	21,900	22,300	14,900	4,500		86,500
1986	6,400	1,600[c]	6,700	18,300	17,000	6,600	3,300		59,900
87	5,700	[c]	7,300	16,500	27,500	11,800	3,200		72,000
88	3,500	[c]	5,500	14,400	29,800	20,700	3,200		77,100
89	5,100	2,000	6,700	13,000	24,700	18,500	2,200		71,500
90	4,700	2,200	6,600	12,400	18,800	27,300	3,200	1,400	76,600
20-Year Ave.	5,305	4,772	7,895	16,890	17,310	20,430	3,853		76,455
1971-80 Ave.	4,920	5,980	7,180	16,370	13,750	22,390	3,563		73,440
1981-90 Ave.	5,690	3,263	8,610	17,410	20,870	18,470	4,300		77,820

[a] Catches founded to nearest hundred fish. Prior to 1990, harvests are reported by location of permit registration, and include cathes by all subsistence permit holders fishing in each village area, regardless of residency. For 1990, harvests are reported by village of residency, and include fish caught only in the Kvichak District.

[b] Catches are interpolated.

[c] No permits issued.

[1] Catch by non-local fishermen issued a permit in one of the above villages. Prior to 1990, these catches were included under the village in which the permit was issued.

(Sources: 1 and 8)

Appendix Table 48. Subsistence salmon catch by village area, Nushagak District, Bristol Bay, 1971-90.[a]

Year	Dillingham[1]	Manokotak	Aleknagik	Ekwok	New Stuyahok	Koliganek	Other[2]	Total
1971	18,100	8,600	4,200	10,400	5,600	6,400		53,300
72	12,600	3,900	800	6,700	7,000	7,500		38,500
73	19,700	4,700	1,100	8,600	6,800	3,600		44,500
74	23,900	11,600	2,300	10,500	11,800	8,200		68,300
75	22,100	7,100	2,300	6,800	19,200	8,100		65,600
1976	17,700	8,400	2,000	9,000	11,100	5,400		53,600
77	15,700	8,100	1,500	8,000	20,900	6,300		60,500
78	27,700	3,200	2,700	12,900	14,200	7,000		67,700
79	20,600	7,400	1,000	7,200	17,200	8,200		61,600
80	47,900	8,200	3,500	10,400	22,200	20,800		113,000
1981	23,900	6,700	2,900	8,800	23,600	11,400		77,300
82	24,700	2,900	2,400	7,500	22,600	14,300		74,400
83	20,100	5,300	1,900	5,800	18,700	13,300		65,100
84	30,500	4,100	2,600	7,200	16,500	17,100		78,000
85	22,900	3,600	1,600	7,000	14,500	6,800		56,400
1986	31,900	5,500	6,900	7,800	26,400	8,200		86,700
87	33,500	5,900	3,100	6,400	11,400	4,900		65,200
88	29,600	5,500	2,400	6,100	11,700	5,700		61,000
89	31,800	5,800	2,000	4,700	9,700	3,800		57,800
90	28,860	6,600	2,300	4,900	9,900	8,000	700	61,300
20-Year Ave.[3]	25,188	6,155	2,475	7,835	15,050	8,750		65,490
1971-80 Ave.	22,600	7,120	2,140	9,050	13,600	8,150		62,660
1981-90 Ave.	27,776	5,190	2,810	6,620	16,500	9,350		68,320

1 Includes the village of Portage Creek. Clark's Point and Ekuk are also included from 1988-1990.

2 Catch by non-local fishermen issued a permit in one of the above villages. Prior to 1990, these catches were included under the village in which the permit was issued.

3 Over the past 20 years the average Nushagak subsistence catch was composed of 57% sockeye, 13% king, 12% chum, 11% pink and 8% coho salmon.

a Catches rounded to nearest hundred fish. Prior to 1990, harvests are reported by location of permit registration, and include catches by all subsistence permit holders fishing in each village area, regardless of residency. For 1990, harvests are reported by village of residency, and include fish caught only in the Nushagak District.

Appendix Table 49. Personal use salmon catch by species, in number of fish, Bristol Bay, 1982-1990.[a]

Year	Permits Issued	Permits Returned	Sockeye	Chinook	Chum	Pink	Coho	Total
			NAKNEK RIVER					
1982	12	7	207	8	1	2	0	218
83	1	1	30	0	2	0	0	32
84	31	19	516	20	8	11	0	555
85			NO FISHERY ALLOWED					
86	30	25	1,406	9	3	0	0	1,418
1987	26	23	505	10	34	0	0	549
88	25	18	331	2	12	15	0	360
89	27	22	505	7	2	0	0	514
90[b]	0							
			NUSHAGAK RIVER[1]					
1988	45	40	1,745	73	117	3	0	1,938
89	28	23	478	30	121	12	136	777
90[b]	10	10	157	7	2	12	65	243

1 Nushagak Personal Use Fishery established in 1988.

a Catches are extrapolated for all permits issued, based on those returned.

b Technically, no personal use fishery occured in 1990 because the Board of Fisheries, in light of the McDowell vs. State of Alaska case, recognized all state residents as subsistence users. However, permits were issued before the July 1 decision took effect.

BRISTOL BAY SALMON FISHERY

APPENDIX

APPENDIX A. Bristol Bay Tide Tables, June - September, 1990.

NUSHAGAK BAY DISTRICT
CORRECTION TABLE

To correct the TIME and HEIGHT for HIGH or LOW tides for the points given below, add or subtract TIME and FEET from the NUSHAGAK District Tide Table.

	TIME		FEET	
	High	Low	High	Low
BRISTOL BAY				
Port Moller				
(Entrance Point)	—4:33	—4:38	*.56	*.86
Port Heiden	—3:03	—2:55	*0.62	*1.04
EGEGIK RIVER				
Entrance	—1:20	—1:13	*.92	*.92
Egegik	—1:04	+0:04	*.65	*.32
Middle Bluff				
Kvichak Bay	—0:50	—0.50	0.0	0.0
NAKNEK RIVER				
Entrance #	—0:16	+0:26	+2.0 #	—0.3
Morakai Point	—0:11	+1:27	*.90	*.34
Omakatalla Point	—0:12	+3:55	*.37	*.12
Naknek Air Base	+0:57	+4:46	*.13	*.08
KVICHAK RIVER				
Naknek	+0:04	+2:01	*.90	*.28
Kvichak	+0:25	+2:49	*.83	*.34
Levelock	+1:27	+4:24	*.48	*.20
NUSHAGAK BAY				
Protection Point	—0:12	—0:22	—2.6	0.0
Snag Point	+0:49	+1:07	+0.2	—0.4
Black Rock,				
Walrus Islands	+0:07	—0:07	—10.1	*.70
ST. LAWRENCE ISLAND				
Northeast Cape	—1:57	—2:12	*.12	*.06
Fossil River Ent.	—2:06	—2:34	*.06	*.06
Nivrakpak Lagoon Entrance	—2:33	—2:37	*.06	*.06

#No Low water falls below —2 feet.
* Multiply height of District Tide by proper ratio to correct height of High or Low Tides.

HIGH Tides NUSHAGAK District
JUNE 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 Fri	●	10:46	20.3	11:36	16.6
2 Sat	●	11:32	19.0	....	...
3 SUN	●	0:41	17.2	12:17	17.6
4 Mon	●	1:37	17.9	12:59	16.3
5 Tues	•	2:36	18.4	1:40	15.1
6 Wed	•	3:25	18.9	2:22	14.1
7 Thur	•	4:13	19.3	3:01	13.3
8 Fri	•	4:55	19.5	3:39	12.7
9 Sat	•	5:34	19.7	4:21	12.3
10 SUN	•	6:13	19.8	5:01	12.1
11 Mon	•	6:48	19.9	5:49	12.0
12 Tues	•	7:24	19.9	6:38	12.1
13 Wed	•	7:56	19.9	7:32	12.5
14 Thur	•	8:28	19.8	8:28	13.2
15 Fri	•	9:05	19.6	9:27	14.3
16 Sat	•	9:39	19.3	10:29	15.6
17 SUN	●	10:19	18.9	11:29	17.2
18 Mon	●	11:00	18.4	....	...
19 Tues	●	0:29	18.8	11:48	17.9
20 Wed	●	1:29	20.4	12:38	17.5
21 Thur	●	2:29	21.6	1:34	17.1
22 Fri	●	3:26	22.6	2:32	16.7
23 Sat	●	4:23	23.2	3:35	16.4
24 SUN	●	5:19	23.5	4:40	16.1
25 Mon	●	6:11	23.4	5:47	15.9
26 Tues	●	7:04	23.0	6:55	15.8
27 Wed	●	7:54	22.4	8:01	15.8
28 Thur	●	8:40	21.5	9:09	16.1
29 Fri	●	9:27	20.3	10:15	16.5
30 Sat	●	10:10	19.1	11:17	17.0

LOW Tides NUSHAGAK District
JUNE 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 Fri	●	4:26	2.3	5:18	0.7
2 Sat	●	5:25	4.0	6:07	0.2
3 SUN	●	6:24	5.4	6:53	-0.1
4 Mon	●	7:24	6.6	7:35	-0.2
5 Tues	•	8:21	7.3	8:18	-0.1
6 Wed	•	9:17	7.8	8:59	0.0
7 Thur	•	10:09	8.1	9:40	0.2
8 Fri	•	10:59	8.1	10:19	0.4
9 Sat	•	11:46	8.1	11:01	0.6
10 SUN	•	12:32	7.9	11:40	0.9
11 Mon	•	....	...	1:14	7.5
12 Tues	•	0:21	1.3	1:53	6.9
13 Wed	•	1:00	1.8	2:34	6.0
14 Thur	•	1:46	2.4	3:10	5.0
15 Fri	•	2:35	3.2	3:49	3.6
16 Sat	•	3:27	4.1	4:28	1.9
17 SUN	●	4:24	5.0	5:10	0.2
18 Mon	●	5:25	5.9	5:55	-1.5
19 Tues	●	6:27	6.6	6:42	-2.9
20 Wed	●	7:30	7.0	7:32	-4.1
21 Thur	●	8:31	7.1	8:27	-4.8
22 Fri	●	9:32	6.9	9:21	-5.0
23 Sat	●	10:32	6.4	10:17	-4.7
24 SUN	●	11:31	5.7	11:14	-3.9
25 Mon	●	....	...	12:30	4.8
26 Tues	●	0:12	-2.7	1:26	3.7
27 Wed	●	1:10	-1.2	2:18	2.6
28 Thur	●	2:06	0.6	3:10	1.7
29 Fri	●	3:05	2.3	3:59	0.9
30 Sat	●	4:01	4.0	4:46	0.3

HIGH Tides NUSHAGAK District
JULY 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 SUN	●	10:52	17.8	....	...
2 Mon	●	0:16	17.6	11:34	16.6
3 Tues	●	1:11	18.1	12:15	15.6
4 Wed	•	2:02	18.5	12:54	14.7
5 Thur	•	2:49	18.9	1:36	14.0
6 Fri	•	3:34	19.1	2:19	13.5
7 Sat	•	4:20	19.3	3:01	13.1
8 SUN	•	4:58	19.5	3:44	12.8
9 Mon	•	5:36	19.6	4:33	12.7
10 Tues	•	6:11	19.7	5:26	12.7
11 Wed	•	6:45	19.6	6:19	13.1
12 Thur	•	7:18	19.5	7:17	13.7
13 Fri	•	7:54	19.3	8:17	14.8
14 Sat	•	8:28	19.0	9:15	16.0
15 SUN	●	9:06	18.7	10:17	17.4
16 Mon	●	9:49	18.3	11:16	18.8
17 Tues	●	10:35	18.0	....	...
18 Wed	●	0:15	20.0	11:26	17.7
19 Thur	●	1:13	21.0	12:18	17.4
20 Fri	●	2:12	21.7	1:21	17.1
21 Sat	●	3:09	22.2	2:21	16.8
22 SUN	●	4:05	22.3	3:26	16.5
23 Mon	●	4:58	22.3	4:31	16.2
24 Tues	●	5:48	21.9	5:38	16.1
25 Wed	●	6:37	21.3	6:45	16.1
26 Thur	●	7:24	20.5	7:50	16.3
27 Fri	●	8:09	19.5	8:52	16.7
28 Sat	●	8:52	18.5	9:51	17.1
29 SUN	•	9:34	17.4	10:48	17.5
30 Mon	•	10:13	16.5	11:40	17.8
31 Tues	•	10:54	15.7	....	...

LOW Tides NUSHAGAK District
JULY 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 SUN	●	5:00	5.5	5:32	-0.1
2 Mon	•	5:57	6.6	6:15	-0.3
3 Tues	•	6:53	7.4	6:57	-0.4
4 Wed	•	7:49	8.0	7:40	-0.3
5 Thur	•	8:43	8.4	8:23	-0.2
6 Fri	•	9:33	8.5	9:05	-0.1
7 Sat	•	10:22	8.5	9:46	0.2
8 SUN	•	11:11	8.2	10:28	0.5
9 Mon	•	11:53	7.8	11:10	0.9
10 Tues	•	12:35	7.1	11:54	1.5
11 Wed	•	....	...	1:17	6.0
12 Thur	•	0:41	2.2	1:55	4.9
13 Fri	•	1:28	3.1	2:31	3.5
14 Sat	•	2:19	4.0	3:13	1.8
15 SUN	●	3:15	5.0	3:55	0.1
16 Mon	●	4:14	5.8	4:41	-1.4
17 Tues	●	5:13	6.5	5:29	-2.8
18 Wed	●	6:13	6.9	6:21	-3.8
19 Thur	●	7:13	7.1	7:15	-4.3
20 Fri	●	8:13	7.0	8:10	-4.5
21 Sat	●	9:14	6.6	9:06	-4.1
22 SUN	●	10:13	5.9	10:03	-3.3
23 Mon	●	11:09	5.0	11:00	-2.1
24 Tues	●	12:04	4.1	11:57	-0.7
25 Wed	●	....	...	12:57	3.1
26 Thur	●	0:55	0.9	1:49	2.2
27 Fri	●	1:50	2.5	2:37	1.4
28 Sat	●	2:46	3.9	3:23	0.9
29 SUN	●	3:40	5.2	4:09	0.5
30 Mon	●	4:36	6.2	4:51	0.3
31 Tues	•	5:28	7.0	5:37	0.1

HIGH Tides NUSHAGAK District
AUGUST 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 Wed	•	0:32	18.1	11:36	15.1
2 Thur	•	1:18	18.3	12:18	14.6
3 Fri	•	2:05	18.5	1:00	14.2
4 Sat	•	2:51	18.7	1:44	14.0
5 SUN	•	3:33	18.8	2:29	13.8
6 Mon	•	4:14	18.9	3:22	13.7
7 Tues	•	4:50	18.9	4:14	13.9
8 Wed	•	5:25	18.8	5:10	14.3
9 Thur	•	6:01	18.7	6:08	15.1
10 Fri	•	6:38	18.5	7:07	16.1
11 Sat	•	7:15	18.2	8:04	17.2
12 SUN	●	7:56	18.0	9:03	18.4
13 Mon	●	8:39	17.8	10:02	19.5
14 Tues	●	9:27	17.6	11:00	20.3
15 Wed	●	10:19	17.5	11:59	20.9
16 Thur	●	11:15	17.3	....	...
17 Fri	●	0:55	21.2	12:14	17.2
18 Sat	●	1:53	21.3	1:16	17.0
19 SUN	●	2:48	21.2	2:21	16.8
20 Mon	●	3:41	21.0	3:25	16.7
21 Tues	●	4:32	20.5	4:31	16.6
22 Wed	●	5:21	19.8	5:34	16.8
23 Thur	●	6:06	19.0	6:35	17.0
24 Fri	●	6:51	18.0	7:34	17.3
25 Sat	●	7:34	17.1	8:28	17.6
26 SUN	•	8:14	16.3	9:20	17.9
27 Mon	•	8:55	15.6	10:09	18.0
28 Tues	•	9:36	15.1	10:57	18.1
29 Wed	•	10:15	14.7	11:43	18.2
30 Thur	•	10:57	14.5	....	...
31 Fri	•	0:30	18.2	11:40	14.4

LOW Tides NUSHAGAK District
AUGUST 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 Wed	•	6:21	7.6	6:19	0.1
2 Thur	•	7:12	8.0	7:04	0.0
3 Fri	•	8:02	8.2	7:46	0.1
4 Sat	•	8:51	8.2	8:32	0.3
5 SUN	•	9:39	8.0	9:15	0.6
6 Mon	•	10:25	7.5	9:59	1.0
7 Tues	•	11:07	6.8	10:45	1.6
8 Wed	•	11:49	5.8	11:33	2.2
9 Thur	•	....	...	12:31	4.5
10 Fri	•	0:23	3.1	1:10	3.1
11 Sat	•	1:15	3.9	1:52	1.5
12 SUN	●	2:11	4.7	2:39	0.0
13 Mon	●	3:07	5.4	3:26	-1.4
14 Tues	●	4:04	5.9	4:15	-2.5
15 Wed	●	5:03	6.3	5:08	-3.2
16 Thur	●	6:00	6.4	6:04	-3.5
17 Fri	●	6:57	6.3	7:00	-3.4
18 Sat	●	7:58	6.0	7:58	-2.9
19 SUN	●	8:55	5.4	8:54	-2.0
20 Mon	●	9:51	4.6	9:53	-0.9
21 Tues	●	10:46	3.8	10:48	0.4
22 Wed	●	11:39	3.0	11:47	1.8
23 Thur	●	....	...	12:27	2.3
24 Fri	●	0:39	3.1	1:13	1.8
25 Sat	●	1:34	4.2	1:57	1.5
26 SUN	•	2:27	5.1	2:41	1.2
27 Mon	•	3:19	5.9	3:24	1.1
28 Tues	•	4:09	6.5	4:09	1.0
29 Wed	•	4:58	7.0	4:52	0.9
30 Thur	•	5:45	7.3	5:38	0.8
31 Fri	•	6:33	7.4	6:23	0.9

HIGH Tides NUSHAGAK District
SEPTEMBER 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 Sat	•	1:15	18.2	12:26	14.4
2 SUN	•	1:57	18.3	1:17	14.4
3 Mon	•	2:38	18.2	2:09	14.6
4 Tues	•	3:19	18.1	3:03	15.1
5 Wed	•	3:56	18.0	3:59	15.8
6 Thur	•	4:35	17.7	4:59	16.7
7 Fri	•	5:17	17.5	5:54	17.8
8 Sat	•	5:56	17.2	6:53	19.0
9 SUN	●	6:41	17.1	7:50	20.0
10 Mon	●	7:27	17.0	8:47	20.8
11 Tues	●	8:19	16.9	9:43	21.3
12 Wed	●	9:14	17.0	10:42	21.5
13 Thur	●	10:13	17.0	11:38	21.4
14 Fri	●	11:13	17.0	....	...
15 Sat	●	0:34	21.2	12:15	16.9
16 SUN	●	1:28	20.7	1:21	16.9
17 Mon	●	2:21	20.1	2:27	17.0
18 Tues	●	3:14	19.3	3:31	17.2
19 Wed	●	4:00	18.4	4:32	17.5
20 Thur	●	4:49	17.4	5:32	17.9
21 Fri	●	5:31	16.4	6:24	18.2
22 Sat	●	6:16	15.5	7:13	18.5
23 SUN	•	6:55	14.8	8:02	18.6
24 Mon	•	7:37	14.2	8:47	18.7
25 Tues	•	8:15	13.9	9:29	18.7
26 Wed	•	8:57	13.8	10:12	18.6
27 Thur	•	9:38	13.8	10:54	18.5
28 Fri	•	10:21	13.9	11:38	18.4
29 Sat	•	11:07	14.1	....	...
30 SUN	•	0:20	18.3	12:03	14.4

LOW Tides NUSHAGAK District
SEPTEMBER 1990

DATE DAY	DOT'S GUIDE	AM TIME	AM FT	PM TIME	PM FT
1 Sat	•	7:19	7.4	7:09	1.0
2 SUN	•	8:08	7.1	7:56	1.3
3 Mon	•	8:53	6.6	8:45	1.7
4 Tues	•	9:36	5.8	9:32	2.2
5 Wed	•	10:18	4.7	10:23	2.9
6 Thur	•	11:00	3.5	11:18	3.5
7 Fri	•	11:45	2.1	....	...
8 Sat	•	0:11	4.1	12:30	0.7
9 SUN	●	1:06	4.7	1:16	-0.6
10 Mon	●	2:01	5.1	2:05	-1.7
11 Tues	●	3:00	5.3	2:58	-2.4
12 Wed	●	3:55	5.5	3:54	-2.9
13 Thur	●	4:51	5.4	4:50	-2.7
14 Fri	●	5:46	5.1	5:48	-2.3
15 Sat	●	6:45	4.7	6:47	-1.5
16 SUN	●	7:41	4.1	7:46	-0.5
17 Mon	●	8:36	3.5	8:45	0.8
18 Tues	●	9:29	2.8	9:41	2.0
19 Wed	●	10:18	2.3	10:40	3.2
20 Thur	●	11:06	1.9	11:37	4.1
21 Fri	●	11:51	1.7	....	...
22 Sat	●	0:30	4.9	12:34	1.6
23 SUN	•	1:23	5.6	1:17	1.6
24 Mon	•	2:10	6.0	2:00	1.6
25 Tues	•	2:59	6.4	2:41	1.6
26 Wed	•	3:42	6.6	3:25	1.6
27 Thur	•	4:27	6.7	4:09	1.6
28 Fri	•	5:13	6.7	4:54	1.7
29 Sat	•	5:57	6.5	5:43	2.0
30 SUN	•	6:40	6.1	6:29	2.3

Appendix B. Alaska Board of Fisheries regulatory action and management policy changes for the commercial salmon fishery in Bristol Bay, 1990.

Proposal #	Action
EE	Changed the boundary lines of the Egegik District.
191	Described the closed waters of Dago Creek, Ugashik District.
192	Described the closed waters of Big Creek, Egegik District.
FY	Required at least 7 feet of tide to be at the entrance of the Naknek River before any opening during emergency order periods.
164g	Required the Department to manage the Egegik District to provide necessary closures, after the point escapement goal has been reached, to disperse fish throughout the District.
160	Removed the start time (9:00 a.m.) on June 1 for the emergency order fishing period in the Nushagak District.
161	Set the starting date of the emergency order period for the Egegik District at June 16.
178	Gave the Department of Fish and Game emergency order authority to regulate mesh size for management of specific species.
#N	Re-instated 5AAC 06.331 - section (N) (2), (3), and (4) into regulations.
#M-1	Addressed the DNR problem with set net site leases in the Naknek/Kvichak District in relation to 1000-ft from 18-ft high tide mark.
183	Regulated the marking of set net and drift net gear.
P	Clarified 32-ft limit in Bristol Bay and eliminated possible "loop holes."
194	Clarified existing regulation 5AAC 06.370 (d).
#Q	Species registration and re-registration for set gill net and drift gill net permit holders in Bristol Bay.
196a	Specifies when the Department of Fish and Game waives the 48-hr waiting period.
197	Expanded 5 AAC 06.370 (b) to include the entire fishing season.

-continued-

Proposal #	Action
210a	Legalized Area T fishermen to transfer their catch from Area M to the Ugashik Section of Area T during times when Area T fishermen can legally fish in Area M.
220	Prohibited the use of aircraft for the spotting of salmon in Bristol Bay during open fishing periods.